

THE
POLAR

AND

TROPICAL
WORLDS

BY

DR. HARTWIG

ILLUSTRATED



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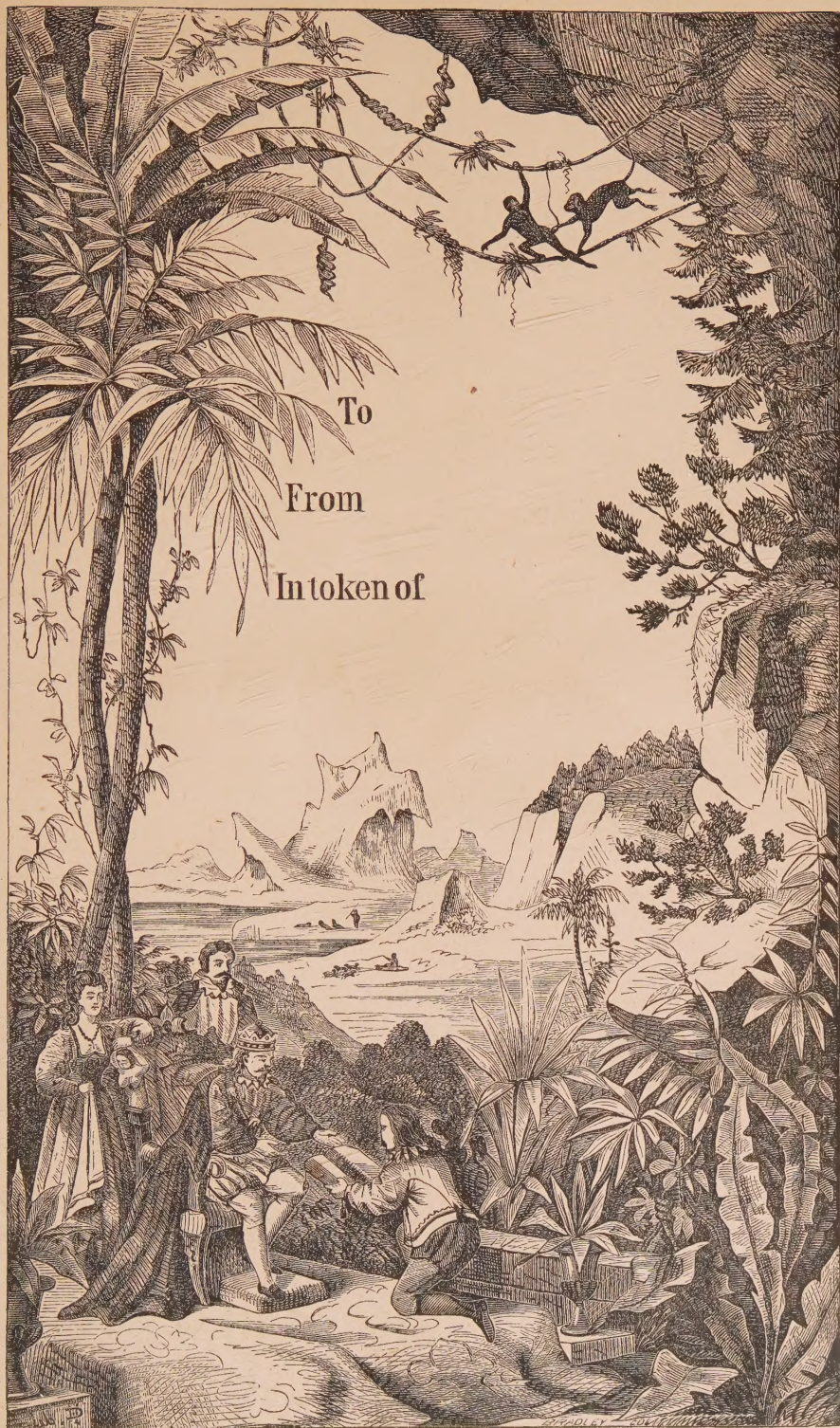
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Dr H. Hartweg

ENGRAVED EXPRESSLY FOR THE POLAR & TROPICAL WORLDS.

THE
POLAR AND TROPICAL
WORLDS:

A DESCRIPTION OF MAN AND NATURE

IN THE

Polar and Equatorial Regions of the Globe.

TWO VOLUMES IN ONE.

EMBRACING ALSO AN ACCOUNT OF THE EXPEDITIONS OF ALL THE ARCTIC EXPLORERS FROM THE
DISCOVERY OF ICELAND, OVER ONE THOUSAND YEARS AGO, TO HALL'S LAST EXPEDITION
IN THE NORTHERN WORLD, TOGETHER WITH THE WONDERFUL DISCOVERIES
AND ADVENTURES OF AGASSIZ, LIVINGSTONE, WALLACE, AND OTHER
DISTINGUISHED TRAVELERS IN THE TROPICAL COUNTRIES.

BY DR. G. HARTWIG,

Author of "The Sea and its Living Wonders," and "The Harmonies of Nature,"

EDITED, WITH ADDITIONAL CHAPTERS, BY

DR. A. H. GUERNSEY.

THE WHOLE SPLENDIDLY ENBELLISHED WITH NEARLY

TWO HUNDRED BEAUTIFUL ILLUSTRATIONS,

TRUE TO NATURE, FROM DESIGNS FURNISHED BY ARTISTS IN THE REGIONS
TO WHICH THEY RELATE.

NEW EDITION.

WITH AN ACCOUNT OF HALL'S LAST EXPEDITION, A SUMMARY OF ARCTIC EXPLORATIONS,
AND NEW MAPS OF THE ARCTIC REGIONS.

SOLD ONLY BY SUBSCRIPTION.

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PREFACE.

IN editing and combining into one volume the two admirable works of Dr. HARTWIG, "The Polar World" and "The Tropical World," I have had in view, while working in the spirit of the Author, to avail myself of all new sources of information, and especially to enlarge upon those features which are of especial interest to American readers. Thus, in "The Polar World," I have added a chapter descriptive of our new acquisition of Alaska, full materials for which came into my hands from our Department of State. I have also added a chapter describing the remarkable exploring expedition in the Arctic regions, performed by my friend, CHARLES FRANCIS HALL. This expedition is especially notable from the clear proof which it furnishes that, had Sir John Franklin only known how to avail himself of the facilities for living afforded by the region in which he was cast away, his whole party might have survived and made their way back to their homes; and also that the fearful sufferings so graphically narrated by the lamented Kane might all have been avoided, had he only have known how to adapt his mode of life to the requirements of an Arctic climate. Of Hall's second expedition, lasting from 1864 to the close of 1869, no full account has been published; he has been too busily engaged in preparing for a third expedition to find time to prepare the narrative of that which he had just accomplished. I have, however, his own testimony to the fact that all his previous opinions are fully confirmed. His own appearance is abundant proof that more than ten years mainly spent in the high Arctic regions, is not necessarily more exhaustive of life, than the same space of time passed among us. In the few weeks which will elapse between the writing of this preface and the opening of northern navigation, Hall will have set out on his third expedition, sent out under the auspices of our Government, and supplied with every requisite for thorough exploration. We may confidently expect that he will be able to solve the still vexed questions as to the nature of the region which encircles the northern pole.

In "The Tropical World," my additions to the labors of Dr. Hartwig have been much more considerable. Since his work was written, immense additions have been made to our knowledge of portions of the region lying within the Tropics. SQUIER has traversed the plateaus of Bolivia and Peru; and apart from the abstracts of his journeys which he has published, he has favored me with much information to be embodied in the great work upon which he has for years been engaged. HOLTON has furnished a curious book on the great table-land of Bogotá; ORTON has crossed the Andes, explored the Valley of Quito, and descended the Amazon from its upper waters to its mouth; and AGASSIZ has made large contributions to our knowledge of the natural history of the mighty Valley of the Amazon.

Our knowledge of the hitherto almost unknown parts of Africa has been more than doubled since Dr. Hartwig prepared his work. ANDERSSON and BALDWIN have told their hunting adventures in Southern Africa; BARTH has traversed the great Sahara; SPEKE and BAKER have solved the mystery of the source of the Nile; DU CHAILLU has again pierced the continent on the line of the equator, and described the mysteries of the home of the gorilla.

Perhaps the most entirely fresh account of a part of the Tropical World is WALLACE'S work on the Malay Archipelago, a group of islands surpassing in extent all the inhabitable parts of Europe, and, although now almost uninhabited, capable of sustaining a population greater than that now living outside of China and India.

Of all these, and many more authorities, I have made free use; and in both parts of the work, I have steadily kept in view the leading idea of Dr. Hartwig: To describe the Polar and Tropical Worlds in their principal natural features, and to point out the influence of their respective climates upon the development of animal and vegetable life, and particularly upon human beings.

The liberality of the Publishers has placed at my disposal illustrations far exceeding in number and beauty those in the original work. They present to the eye information which words would often be inadequate to express to the ear. I trust that my own additions to the work will not be found unworthy of the foundation laid by Dr. Hartwig.

ALFRED H. GUERNSEY.

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WESTERN HEMISPHERE.

THE POLAR WORLD.



THE TUNDRA OF SIBERIA.

CHAPTER I.

THE ARCTIC LANDS.

The barren Grounds or Tundri.—Abundance of animal Life on the Tundri in Summer.—Their Silence and Desolation in Winter.—Protection afforded to Vegetation by the Snow.—Flower-growth in the highest Latitudes.—Character of Tundra Vegetation.—Southern Boundary-line of the barren Grounds.—Their Extent.—The forest Zone.—Arctic Trees.—Slowness of their Growth.—Monotony of the Northern Forests.—Mosquitoes.—The various Causes which determine the Severity of an Arctic Climate.—Insular and Continental Position.—Currents.—Winds.—Extremes of Cold observed by Sir E. Belcher and Dr. Kane.—How is Man able to support the Rigors of an Arctic Winter?—Proofs of a milder Climate having once reigned in the Arctic Regions.—Its Cause according to Dr. Oswald Heer.—Peculiar Beauties of the Arctic Regions.—Sunset.—Long lunar Nights.—The Aurora.

A GLANCE at a map of the Arctic regions shows us that many of the rivers belonging to the three continents—Europe, Asia, America—discharge their waters into the Polar Ocean or its tributary bays. The territories drained by these streams, some of which (such as the Mackenzie, the Yukon, the Lena, the Yenisei, and the Obi) rank among the giant rivers of the earth, form, along with the islands within or near the Arctic circle, the vast region over which the frost-king reigns supreme.

Man styles himself the lord of the earth, and may with some justice lay claim to the title in more genial lands where, armed with the plough, he compels the soil to yield him a variety of fruits; but in those desolate tracts



ARCTIC FOREST.

tinuous belt, stretching through three parts of the world, in a breadth of from 15° to 20° , even the woods of the Amazon, which cover a surface fifteen times greater than that of the United Kingdom, shrink into comparative insignificance. Unlike the tropical forests, which are characterized by an immense variety of trees, these northern woods are almost entirely composed of coniferæ, and one single kind of fir or pine often covers an immense extent of

ground. The European and Asiatic species differ, however, from those which grow in America.

Thus in the Russian empire and Scandinavia we find the Scotch fir (*Pinus sylvestris*), the Siberian fir and larch (*Abies sibirica*, *Larix sibirica*), the *Picea obovata*, and the *Pinus cembra*; while in the Hudson's Bay territories the woods principally consist of the white and black spruce (*Abies alba* and *nigra*), the Canadian larch (*Larix canadensis*, and the gray pine (*Pinus banksiana*). In both continents birch-trees grow farther to the north than the coniferæ, and the dwarf willows form dense thickets on the shores of every river and lake. Various species of the service-tree, the ash, and the elder are also met with in the Arctic forests; and both under the shelter of the woods and beyond their limits, nature, as if to compensate for the want of fruit-trees, produces in favorable localities an abundance of bilberries, bogberries, cranberries, etc. (*Empetrum*, *Vaccinium*), whose fruit is a great boon to man and beast. When congealed by the autumnal frosts, the berries frequently remain hanging on the bushes until the snow melts in the following June, and are then a considerable resource to the flocks of water-fowl migrating to their northern breeding-places, or to the bear awakening from his winter sleep.



VERGE OF FOREST REGION.

There are many proofs that a milder climate once reigned in the northern regions of the globe. Fossil pieces of wood, petrified acorns and fir-cones



ARCTIC CLOTHING.

have been found in the interior of Banks's Land by M'Clure's sledging-parties. At Anakerdluk, in North Greenland (70° N.), a large forest lies buried on a mountain surrounded by glaciers, 1080 feet above the level of the sea. Not only the trunks and branches, but even the leaves, fruit-cones, and seeds have been preserved in the soil, and enable the botanist to determine the species of the plants to which they belong. They show that, besides firs and sequoias, oaks, plantains, elms, magnolias, and even laurels, indicating a climate such as that of Lausanne or Geneva, flourished during the miocene period in a country where now even the willow is compelled to creep along the ground. During the same epoch of the earth's history Spitzbergen was likewise covered with stately forests. The same poplars and the same swamp-cypress (*Taxodium dubium*) which then flourished in North Greenland have been found in a fossilized state at Bell Sound (76° N.) by the Swedish naturalists, who also discovered a plantain and a linden as high as 78° and 79° in King's Bay—a proof that in those times the climate of Spitzbergen can not have been colder



PREPARING BOOT-SOLES.

boot-soles, others were sewing, while one was tending a cross baby. It is rare to find an Inuit child who is not very quiet, but this little fellow had eaten a piece of raw blubber, which had disordered him. Some of the amusing tricks played by these Esquimaux women are especially deserving of notice. The variety of games performed by a string tied at the ends, similar to a 'cat's cradle,' completely throws into the shade our adepts at home. I never before witnessed such a number of intricate ways in which a simple string could be used. One arrangement represented a deer; another, a whale; a third, the walrus; a fourth, the seal; and so on without end."

The short Arctic summer soon came to a close. On the morning of the 26th of September came light winds from the north-west; by noon it began to snow, the wind increasing to a gale. The whaling-boats all came in, and preparations were made for bad weather. During the night the storm grew hourly fiercer. The "Rescue" dragged her anchor, and was dashed upon the rocks an utter wreck. Hall's little boat, upon which he had so much relied, was torn from its moorings and lost, "dooming me," says Hall, "to a wreck of disappointment in the hopes I had cherished concerning her. The 'George Henry' was also in imminent peril, but outrode the tempest; but on her next voyage, eighteen months later, was lost at a point hardly a hundred miles distant."

The "George Henry" was soon after laid up in winter-quarters, fairly blocked in by ice. Hall in the mean time had made himself acquainted with the Es-

elled by our earth before. We come from the unknown, and plunge into the unknown; but so much is certain, that our solar system rolls at present through a space but thinly peopled with stars, and there is no reason to doubt that it may once have wandered through one of those celestial provinces where, as the telescope shows us, constellations are far more densely clustered. But, as every star is a blazing sun, the greater or lesser number of these heavenly bodies must evidently have a proportionate influence upon the temperature of space; and thus we may suppose that during the miocene period our earth, being at that time in a *populous* sidereal region, enjoyed the benefit of a higher temperature, which clothed even its poles with verdure. In the course of ages the sun conducted his herd of planets into more solitary and colder regions, which caused the warm miocene times to be followed by the glacial period, during which the Swiss flat lands bore an Arctic character, and finally



AURORA SEEN IN NORWAY.

the sun emerged into a space of an intermediate character, which determines the present condition of the climates of our globe.

Though Nature generally wears a more stern and forbidding aspect on advancing toward the pole, yet the high latitudes have many beauties of their



AURORA SEEN IN GREENLAND.

own. Nothing can exceed the magnificence of an Arctic sunset, clothing the snow-clad mountains and the skies with all the glories of color, or be more serenely beautiful than the clear star-light night, illumined by the brilliant moon, which for days continually circles around the horizon, never setting until

she has run her long course of brightness. The uniform whiteness of the landscape and the general transparency of the atmosphere add to the lustre of her beams, which serve the natives to guide their nomadic life, and to lead them to their hunting-grounds.

But of all the magnificent spectacles that relieve the monotonous gloom of the Arctic winter, there is none to equal the magical beauty of the Aurora. Night covers the snow-clad earth; the stars glimmer feebly through the haze which so frequently dims their brilliancy in the high latitudes, when suddenly a broad and clear bow of light spans the horizon in the direction where it is traversed by the magnetic meridian. This bow sometimes remains for several hours, heaving or waving to and fro, before it sends forth streams of light ascending to the zenith. Sometimes these flashes proceed from the bow of light alone; at others they simultaneously shoot forth from many opposite parts of the horizon, and form a vast sea of fire whose brilliant waves are continually changing their position. Finally they all unite in a magnificent crown or copula of light, with the appearance of which the phenomenon attains its highest degree of splendor. The brilliancy of the streams, which are commonly red at their base, green in the middle, and light yellow toward the zenith, increases, while at the same time they dart with greater vivacity through the skies. The colors are wonderfully transparent, the red approaching to a clear blood-red, the green to a pale emerald tint. On turning from the flaming firmament to the earth, this also is seen to glow with a magical light. The dark sea, black as jet, forms a striking contrast to the white snow-plain or the distant ice-mountain; all the outlines tremble as if they belonged to the unreal world of dreams. The imposing silence of the night heightens the charms of the magnificent spectacle.

But gradually the crown fades, the bow of light dissolves, the streams become shorter, less frequent, and less vivid; and finally the gloom of winter once more descends upon the northern desert.



BARBEKARK AND THE REINDEER.

held to be a great delicacy, the Innuits never eat that or the head of the bear; nor, if they can prevent it, will they suffer their dogs to do so.

The Inuit dogs also sometimes hunt the reindeer. Hall's dogs one day gave chase to a deer, and one of them, Barbekark, sprung at its throat, and bit through skin, windpipe, jugular, and tongue, taking out the piece as clearly as though it had been cut with a knife. Barbekark was brought to the United States by Mr. Hall, and died there. His stuffed skin showed him to be a noble beast of unusual size.

The walrus enters largely into the supplies of the Innuits. They manifest much courage and skill in harpooning these ungainly beasts. The hunter goes out armed with a lance and a peculiar harpoon made for that purpose. A long hide-rope is attached to the head of the harpoon, and coiled around the neck of the hunter, who crawls along until he comes within striking distance of the walrus, who lies basking upon the ice. The walrus dives at once; the hunter slips the coil off from his neck, and fastens the end of it to a spear-driven into the ice; thus tethering the animal. As soon as the walrus comes up he is dispatched with a long



HEAD OF REINDEER.



ARCTIC NAVIGATION.

CHAPTER III.

THE ARCTIC SEAS.

Dangers peculiar to the Arctic Sea.—Ice-fields.—Hummocks.—Collision of Ice-fields.—Icebergs.—Their Origin.—Their Size.—The Glaciers which give them Birth.—Their Beauty.—Sometimes useful Auxiliaries to the Mariner.—Dangers of anchoring to a Berg.—A crumbling Berg.—The Ice-blink.—Fogs.—Transparency of the Atmosphere.—Phenomena of Reflection and Refraction.—Causes which prevent the Accumulation of Polar Ice.—Tides.—Currents.—Ice a bad Conductor of Heat.—Wise Provisions of Nature.

THE heart of the first navigator, says Horace, must have been shielded with threefold brass—and yet the poet knew but the sunny Mediterranean, with its tepid floods and smiling shores: how, then, would he have found words to express his astonishment at the intrepid seamen who, to open new vistas to science or new roads to commerce, first ventured to face the unknown terrors of the Arctic main?

In every part of the ocean the mariner has to guard against the perils of hidden shoals and sunken cliffs, but the high northern waters are doubly and trebly dangerous; for here, besides those rocks which are firmly rooted to the ground, there are others which, freely floating about, threaten to crush his vessel to pieces, or to force it along with them in helpless bondage.

The Arctic navigators have given various names to these movable shoals,



DRIFTING IN THE ICE.

Not seldom ice-fields are whirled about in rotatory motion, which causes their circumference to gyrate with a velocity of several miles per hour. When a field thus sweeping through the waters comes into collision with another



FORMS OF ICEBERGS.

which may possibly be revolving with equal rapidity in an opposite direction—when masses not seldom twenty or thirty miles in diameter, and each weigh-

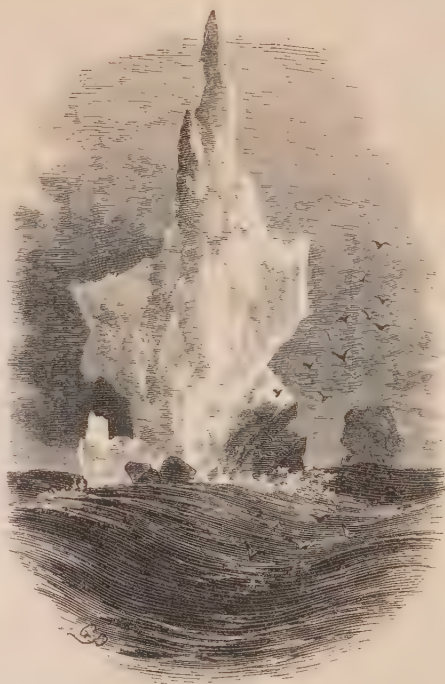


FORMS OF ICEBERGS.

ing many millions of tons, clash together, imagination can hardly conceive a more appalling scene. The whalers at all times require unremitting vigilance to secure their safety, but scarcely in any situation so much as when navigating amidst these fields, which are more particularly dangerous in foggy weather, as their motions can not then be distinctly observed. No wonder that since the establishment of the fishery numbers of vessels have been crushed to pieces between two fields in motion, for the strongest ship ever built must needs

be utterly unable to resist their power. Some have been uplifted and thrown upon the ice; some have had their hulls completely torn open; and others have been overrun by the ice, and buried beneath the fragments piled upon their wreck.

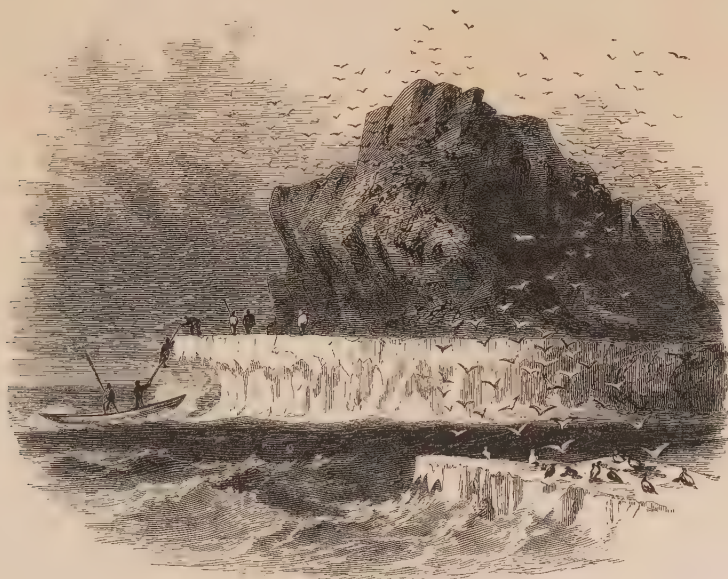
The icebergs, which, as their name indicates, rise above the water to a much more considerable height than the ice-fields, have a very different origin, as they are not formed in the sea itself, but by the glaciers of the northern highlands. As our rivers are continually pouring their streams into the ocean, so many of the glaciers or ice-rivers of the Arctic zone, descending to the water-edge, are slowly but constantly forcing themselves farther and farther into the sea. In the summer season, when the ice is particularly fragile, the force of cohesion is often overcome by the weight of the prodigious masses that overhang the sea or have been undermined by its waters; and in the winter, when the air is probably 40° or 50° below zero and the sea from 28° to 30° above, the unequal expansion of those parts of the mass exposed to so great a difference of temperature can not fail to produce the separation of large portions.



FORMS OF ICEBERGS.

But though often dangerous neighbors, the bergs occasionally prove useful auxiliaries to the mariner. From their greater bulk lying below the water-line, they are either drifted along by the under-current against the wind, or, from their vast dimensions, are not perceptibly influenced even by the strongest gale, but, on the contrary, have the appearance of moving to windward, because every other kind of ice is drifted rapidly past them. Thus in strong adverse winds, their broad masses, fronting the storm like bulwarks, not seldom afford protection to ships mooring under their lee.

Anchoring to a berg is, however, not always unattended with danger, particularly when the summer is far advanced, or in a lower latitude, as all ice becomes exceedingly fragile when acted on by the sun or by a temperate atmos-



SCALING AN ICEBERG.

phere. The blow of an axe then sometimes suffices to rend an iceberg asunder, and to bury the careless seaman beneath its ruins, or to hurl him into the yawning chasm.

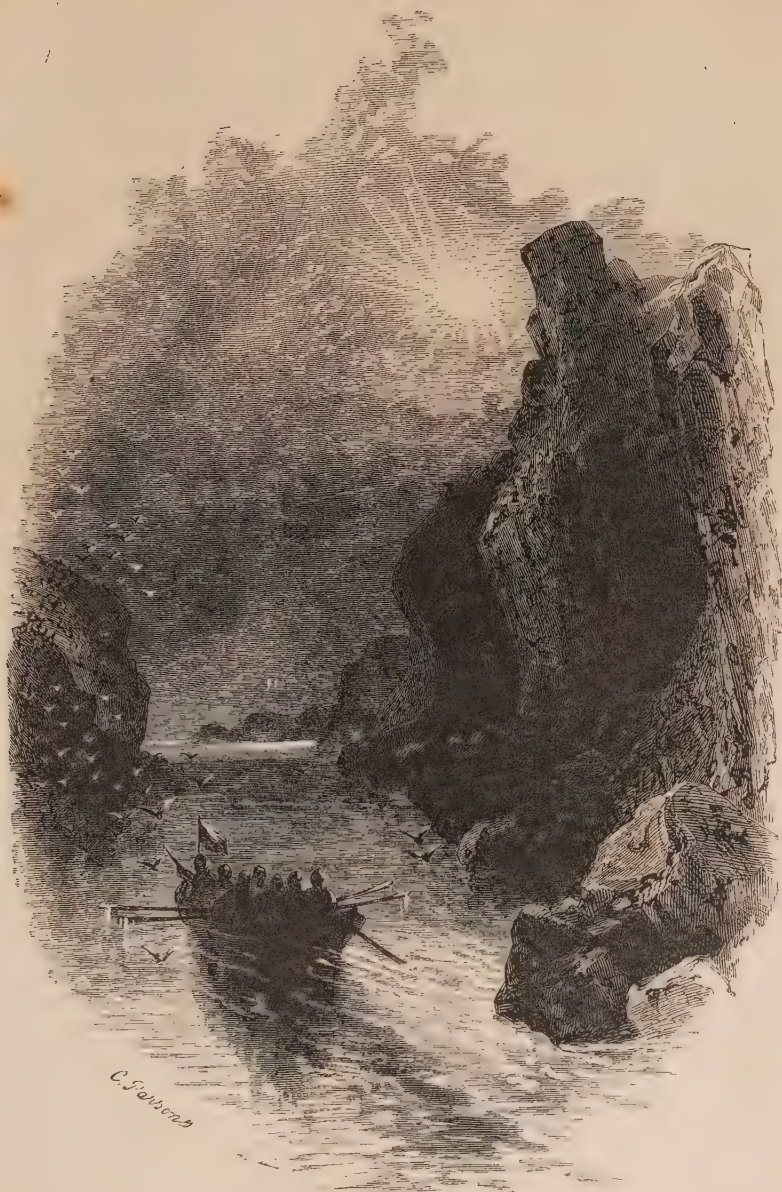
Thus Scoresby relates the adventure of two sailors who were attempting to fix an anchor to a berg. They began to hew a hole into the ice, but scarcely had the first blow been struck, when suddenly the immense mass split from top to bottom and fell asunder, the two halves falling in contrary directions with a prodigious crash. One of the sailors, who was possessed of great presence of mind, immediately scaled the huge fragment on which he was standing, and remained rocking to and fro on its summit until its equilibrium was restored; but his companion, falling between the masses, would most likely have been crushed to pieces if the current caused by their motion had not swept him within reach of the boat that was waiting for them.

Frequently large pieces detach themselves spontaneously from an iceberg

him a place among the marine animals of the Arctic zone. He hunts by scent, and is constantly running across and against the wind, which prevails from the northward, so that the same instinct which directs his search for prey also serves the important purpose of guiding him in the direction of the land and more solid ice. His favorite food is the seal, which he surprises crouching down with his fore paws doubled underneath, and pushing himself noiselessly forward with his hinder legs until within a few yards, when he springs upon his victim, whether in the water or upon the ice. He can swim at the rate of three miles an hour, and can dive to a considerable distance. Though he attacks man when hungry, wounded, or provoked, he will not injure him when food more to his liking is at hand. Sir Francis M'Clintock relates an anecdote of a native of Upernavik who was out one dark winter's day visiting his seal-nets. He found a seal entangled, and whilst kneeling down over it upon the ice to get it clear, he received a slap on the back—from his companion as he supposed; but a second and heavier blow made him look smartly round. He was horror-stricken to see a peculiarly grim old bear instead of his comrade. Without taking further notice of the man, Bruin tore the seal out of the net, and began his supper. He was not interrupted, nor did the man wait to see the meal finished, fearing, no doubt, that his uninvited and uncereemonious guest might keep a corner for him.

Many instances have been observed of the peculiar sagacity of the Polar bear. Scoresby relates that the captain of a whaler, being anxious to procure a bear without wounding the skin, made trial of the stratagem of laying the noose of a rope in the snow, and placing a piece of *kreng*, or whale's carcass, within it. A bear, ranging the neighboring ice, was soon enticed to the spot. Approaching the bait, he seized it in his mouth; but his foot, at the same moment, by a jerk of the rope, being entangled in the noose, he pushed it off with the adjoining paw, and deliberately retired. After having eaten the piece he carried away with him, he returned. The noose, with another piece of *kreng*, being then replaced, he pushed the rope aside, and again walked triumphantly off with the *kreng*. A third time the noose was laid, and this time the rope was buried in the snow, and the bait laid in a deep hole dug in the centre. But Bruin, after snuffing about the place for a few minutes, scraped the snow away with his paw, threw the rope aside, and escaped unhurt with his prize.

The she-bear is taught by a wonderful instinct to shelter her young under the snow. Towards the month of December she retreats to the side of a rock, where, by dint of scraping and allowing the snow to fall upon her, she forms a cell in which to reside during the winter. There is no fear that she should be stifled for want of air, for the warmth of her breath always keeps a small passage open, and the snow, instead of forming a thick uniform sheet, is broken by a little hole, round which is collected a mass of glittering hoar-frost, caused by the congelation of the breath. Within this strange nursery she produces her young, and remains with them beneath the snow until the month of March, when she emerges into the open air with her baby bears. As the time passes on, the breath of the family, together with the warmth exhaled from their



AN ARCTIC CHANNEL.

either in winter or in summer, more than from fifty to a hundred miles from land. And even in the narrow channels separating the islands of the Parry Archipelago, or at the mouth of Smith Sound, the waters will not freeze over, except when sheltered by the land, or when an ice-pack, accumulated by long continuance of winds from one quarter, affords the same protection.

But the constant motion of the Polar Sea, wherever it expands to a consider-



LAVA-FIELDS.

CHAPTER V.

ICELAND.

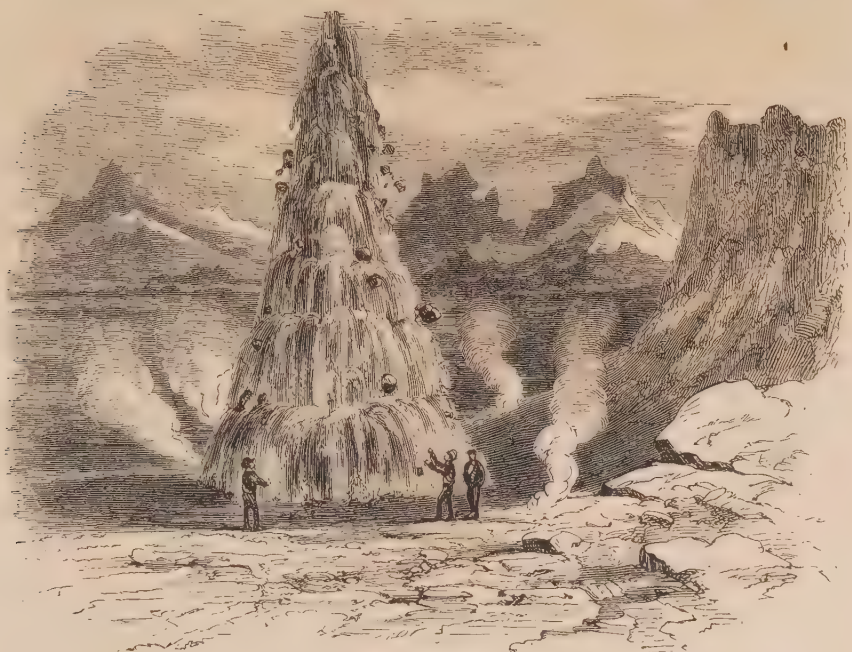
Volcanic Origin of the Island.—The Klofa Jökul.—Lava-streams.—The Burning Mountains of Krisuvik.—The Mud-caldrons of Reykjahlid.—The Tungu-hver at Reykbolt.—The Great Geysir.—The Strokkur.—Crystal Pools.—The Almannagja.—The Surts-hellir.—Beautiful Ice-cave.—The Gotba Foss.—The Detti Foss.—Climate.—Vegetation.—Cattle.—Barbarous Mode of Sheep-sheering.—Reindeer.—Polar Bears.—Birds.—The Eider-duck.—Videy.—Vigr.—The Wild Swan.—The Raven.—The Jerfalcon.—The Giant auk, or Geirfugl.—Fish.—Fishing Season.—The White Shark.—Mineral Kingdom.—Sulphur.—Peat.—Drift-wood.

ICELAND might as well be called Fireland, for all its 40,000 square miles have originally been upheaved from the depths of the waters by volcanic power. First, at some immeasurably distant period of the world's history, the small nucleus of the future island began to struggle into existence against the superincumbent weight of the ocean; then, in the course of ages, cone rose after cone, crater was formed after crater, eruption followed on eruption, and lava-stream on lava-stream, until finally the Iceland of the present day was piled up with her gigantic "jökuls," or ice-mountains, and her vast promontories, stretching like huge buttresses far out into the sea.

In winter, when an almost perpetual night covers the wastes of this fire-born land, and the waves of a stormy ocean thunder against its shores, imagination can hardly picture a more desolate scene; but in summer the rugged nature of Iceland invests itself with many a charm. Then the eye reposes with de-

into the Hvita, or White River. Soon the subterranean thunder, the shaking of the ground, the simmering above the tube, and the other phenomena which attend each minor eruption, begin again, to be followed by a new period of rest, and thus this wonderful play of nature goes on day after day, year after year, and century after century. The mound of the Geysir bears witness to its immense antiquity, as its water contains but a minute portion of silica.

After the Geysir, the most remarkable fountain of these Phlegrean fields is the great Strokkr, situated about four hundred feet from the former. Its tube,



THE STROKKR.

the margin of which is almost even with the general surface, the small mound and basin being hardly discernible, is funnel-shaped, or resembling the flower of a convolvulus, having a depth of forty-eight feet, and a diameter of six feet at the mouth, but contracting, at twenty-two feet from the bottom, to only eleven inches. The water stands from nine to twelve feet under the brim, and is generally in violent ebullition. A short time before the beginning of the eruptions, which are more frequent than those of the Great Geysir, an enormous mass of steam rushes from the tube, and is followed by a rapid succession of jets, sometimes rising to the height of 120 or 150 feet, and dissolving into silvery mist. A peculiarity of the Strokkr is that it can at any time be provoked to an eruption by throwing into the orifice large masses of peat or turf; thus choking the shaft, and preventing the free escape of the steam. After the lapse of about ten minutes, the boiling fluid, as if indignant at this attempt upon its liberty, heaves up a column of mud and water, with fragments of peat, as black as ink.

enormous Almannagja, or Allman's Rift, suddenly gapes beneath his feet—a colossal rent extending above a mile in length, and inclosed on both sides by abrupt walls of black lava, frequently upward of a hundred feet high, and separated from about fifty to seventy feet from each other.



THE ALMANNAGJA.

A corresponding chasm, but of inferior dimensions, the Hrafnagja, or Raven's Rift, opens its black rampart to the east, about eight miles farther on; and both form the boundaries of the verdant plain of Thingvall, which by a grand convulsion of nature has itself been shattered into innumerable small parallel crevices and fissures fifty or sixty feet deep.

Of the Hrafnagja Mr. Ross Browne says: "A toilsome ride of eight miles brought us to the edge of the Pass, which in point of rugged grandeur far surpasses the Almannagja, though it lacks the extent and symmetry which give the latter such a remarkable effect. Here was a tremendous gap in the earth, over a hundred feet deep, hacked and shivered into a thousand fantastic shapes; the sides a succession of the wildest accidents; the bottom a chaos of broken lava, all tossed about in the most terrific confusion. It is not, however, the extraordinary desolation of the scene that constitutes its principal interest. The resistless power which had rent the great lava-bed asunder, as if touched with pity at the ruin, had also flung from the tottering cliffs a causeway across the gap, which now forms the only means of passing over the great Hrafnagja. No human hands could have created such a colossal work as this; the imagination is lost in its massive grandeur; and when we reflect that miles of an almost impassable country would otherwise have to be traversed in order to



THE HRAFNAGJA.

reach the opposite side of the gap, the conclusion is irresistible that in the battle of the elements Nature still had a kindly remembrance of man.



THE TINTRON ROCK.



ICELANDIC HORSES.

but no attempts have been made to tame them; for, though indispensable to the Laplander, they are quite superfluous in Iceland, which is too rugged and too much intersected by streams to admit of sledging. They are, in fact, generally considered as a nuisance, as they eat away the Icelandic moss, which the islanders would willingly keep for their own use.

The Polar bear is but a casual visitor in Iceland. About a dozen come drifting every year with the ice from Jan Mayen, or Spitzbergen, to the northern shores. Ravenous with hunger, they immediately attack the first herds they meet with; but their ravages do not last long, for the neighborhood, arising in arms, soon puts an end to their existence.

In Iceland the ornithologist finds a rich field for his favorite study, as there are no less than eighty-two different species of indigenous birds, besides twenty-one that are only casual visitors, and six that have been introduced by man.

The swampy grounds in the interior of the country are peopled with legions of golden and king plovers, of snipes and red-shanks; the lakes abound with swans, ducks, and geese of various kinds; the snow-bunting enlivens the solitude of the rocky wilderness with his lively note, and, wherever grass grows, the common pipit (*Anthus pratensis*) builds its neat little nest, well lined with horsehair. Like the lark, he rises singing from the ground, and frequently surprises the traveller with his melodious warbling, which sounds doubly sweet in the lifeless waste.

The eider-duck holds the first rank among the useful birds of Iceland. Its chief breeding-places are small flat islands on various parts of the coast, where it is safe from the attacks of the Arctic fox, such as Akuréy, Flatéy, and Videy,



ARCTIC DISCOVERERS.

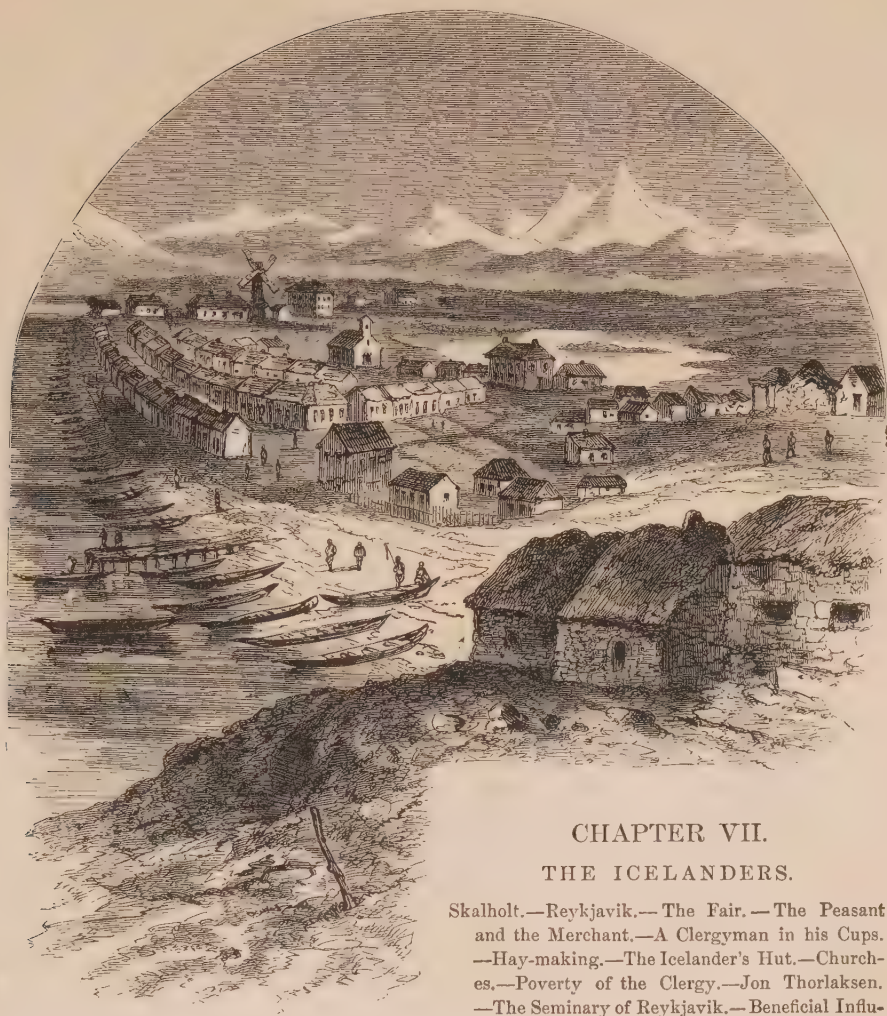


NORTH POLAR WORLD



SOUTH POLAR WORLD.





REYKJAVIK, THE CAPITAL OF ICELAND.

CHAPTER VII.

THE ICELANDERS.

Skalholt.—Reykjavik.—The Fair.—The Peasant and the Merchant.—A Clergyman in his Cups.—Hay-making.—The Icelandic Hut.—Churches.—Poverty of the Clergy.—Jon Thorlaksen.—The Seminary of Reykjavik.—Beneficial Influence of the Clergy.—Home Education.—The Icelandic Winter's Evening.—Taste for Literature.—The Language.—The Public Library at Reyk-

javik.—The Icelandic Literary Society.—Icelandic Newspapers.—Longevity.—Leprosy.—Travelling in Iceland.—Fording the Rivers.—Crossing of the Skeidara by Mr. Holland.—A Night's Bivouac.

NEXT to Thingvalla, there is no place in Iceland so replete with historical interest as Skalholt, its ancient capital. Here in the eleventh century was founded the first school in the island; here was the seat of its first bishops; here flourished a succession of great orators, historians, and poets; Isleif, the oldest chronicler of the North; Gissur, who in the beginning of the twelfth century had visited all the countries of Europe and spoke all their languages; the philologist Thorlak, and Finnur Johnson, the learned author of the "Ecclesiastical History of Iceland." The Cathedral of Skalholt was renowned far and wide for its size, and in the year 1100, Latin, poetry, music, and rhetoric, the four liberal arts, were taught in its school, more than they were at that time



ICELANDIC HOUSES.

cured rests upon these walls, and is covered with turf and sods. On one side (generally facing the south) are several gable ends and doors, each surmounted with a weather-cock. These are the entrances to the dwelling-house proper, to the smithy, store-room, cow-shed, etc. A long narrow passage, dark as pitch, and redolent of unsavory odors, leads to the several apartments, which are separated from each other by thick walls of turf, each having also its own roof, so that the peasant's dwelling is in fact a conglomeration of low huts, which sometimes receive their light through small windows in the front, but more frequently through holes in the roof, covered with a piece of glass or skin. The floors are of stamped earth; the hearth is made of a few stones clumsily piled together; a cask or barrel, with the two ends knocked out, answers the purpose of a chimney, or else the smoke is allowed to escape through a mere hole in the roof.

The thick turf walls, the dirty floor, the personal uncleanness of the inhabitants, all contribute to the pollution of the atmosphere. No piece of furniture seems ever to have been cleaned since it was first put into use; all is disorder and confusion. Ventilation is utterly impossible, and the whole family, frequently consisting of twenty persons or more, sleep in the same dormitory, as well as any strangers who may happen to drop in. On either side of this apartment are bunks three or four feet in width, on which the sleepers range themselves.

Such are in general the dwellings of the farmers and clergy, for but very few of the more wealthy inhabitants live in any way according to our notions of comfort, while the cots of the poor fisherman are so wretched that one can hardly believe them to be tenanted by human beings.

coal is not the least of his labors, for whatever the distance may be to the nearest thicket of dwarf-birch, he must go thither to burn the wood, and to bring it home when charred across his horse's back. His hut is scarcely better than that of the meanest fisherman; a bed, a rickety table, a few chairs, and a chest or two, are all his furniture. This is, as long as he lives, the condition of the Icelandic clergyman, and learning, virtue, and even genius are but too frequently buried under this squalid poverty.

But few of my readers have probably ever heard of the poet Jon Thorlakson, but who can withhold the tribute of his admiration from the poor priest of Backa, who with a fixed income of less than £6 a year, and condemned to all the drudgery which I have described, finished at seventy years of age a translation of Milton's "Paradise Lost," having previously translated Pope's "Essay on Man."

Three of the first books only of the "Paradise Lost" were printed by the Icelandic Literary Society, when it was dissolved in 1796, and to print the rest at his own expense was of course impossible. In a few Icelandic verses, Thorlakson touchingly alludes to his penury:—"Ever since I came into this world I have been wedded to Poverty, who has now hugged me to her bosom these seventy winters, all but two; and whether we shall ever be separated here below is only known to Him who joined us together."

As if Providence had intended to teach the old man that we must hope to the last, he soon after received the unexpected visit of Mr. Henderson, an agent of the British and Foreign Bible Society, who thus relates his interview:

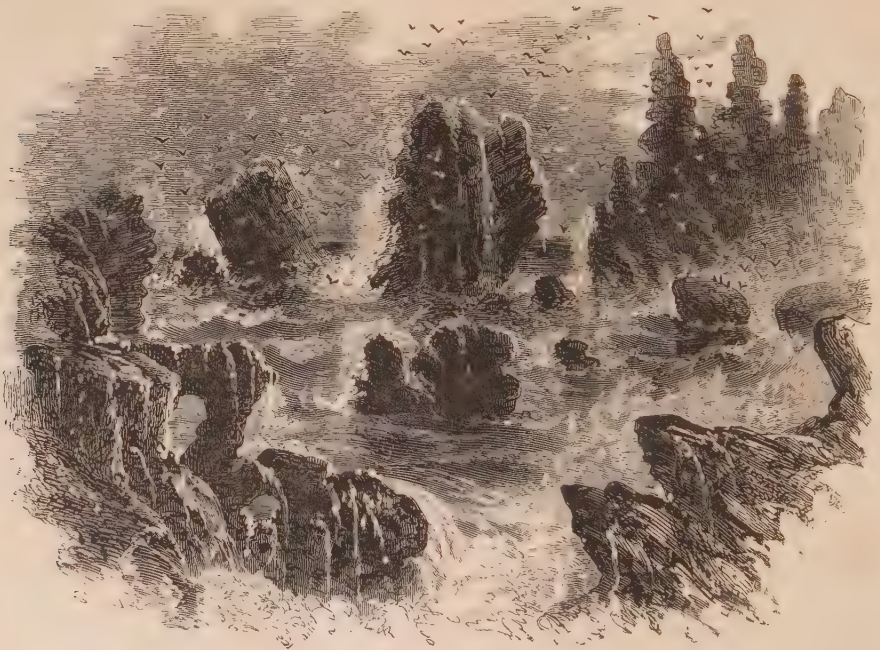
"Like most of his brethren at this season of the year, we found him in the meadow assisting his people in hay-making. On hearing of our arrival, he made all the haste home which his age and infirmity would allow, and bidding us welcome to his lowly abode, ushered us into the humble apartment where he translated my countrymen into Icelandic. The door is not quite four feet in height, and the room may be about eight feet in length by six in breadth. At the inner end is the poet's bed, and close to the door, over against a small window, not exceeding two feet square, is a table where he commits to paper the effusions of his Muse. On my telling him that my countrymen would not have forgiven me, nor could I have forgiven myself, had I passed through this part of the island without paying him a visit, he replied that the translation of Mil-



THE PASTOR OF THINGVALLA.

of the summer, communication is impossible. It will now be understood why tourists are so little inclined to visit the Westmans, despite the magnificence of their coast scenery, for who has the patience to tarry in a miserable hut on the opposite mainland till the cascade informs him that they are accessible, or is inclined to run the risk of being detained by a sudden change of the weather for weeks or even months on these solitary rocks ?

Mr. Ross Browne thus describes the general aspect of the coast of Iceland : "Nothing could surpass the desolate grandeur of the coast as we approached the point of Reykjaness. It was of an almost infernal blackness. The whole country seemed upturned, rifted, shattered, and scattered about in a vast chaos of ruin. Huge cliffs of lava split down to their bases toppled over the surf. Rocks of every conceivable shape, scorched and blasted with fire, wrested from the main and hurled into the sea, battled with the waves, their black scraggy points piercing the mist like giant hands upthrown to smite or sink in a fierce death-struggle. The wild havoc wrought in the conflict of elements was appalling. Birds screamed over the fearful wreck of matter. The surf from the inrolling waves broke against the charred and shattered desert of ruin with a terrific roar. Columns of spray shot up over the blackened fragments of lava, while in every opening the lashed waters, discolored by the collision, seethed and surged as in a huge caldron."

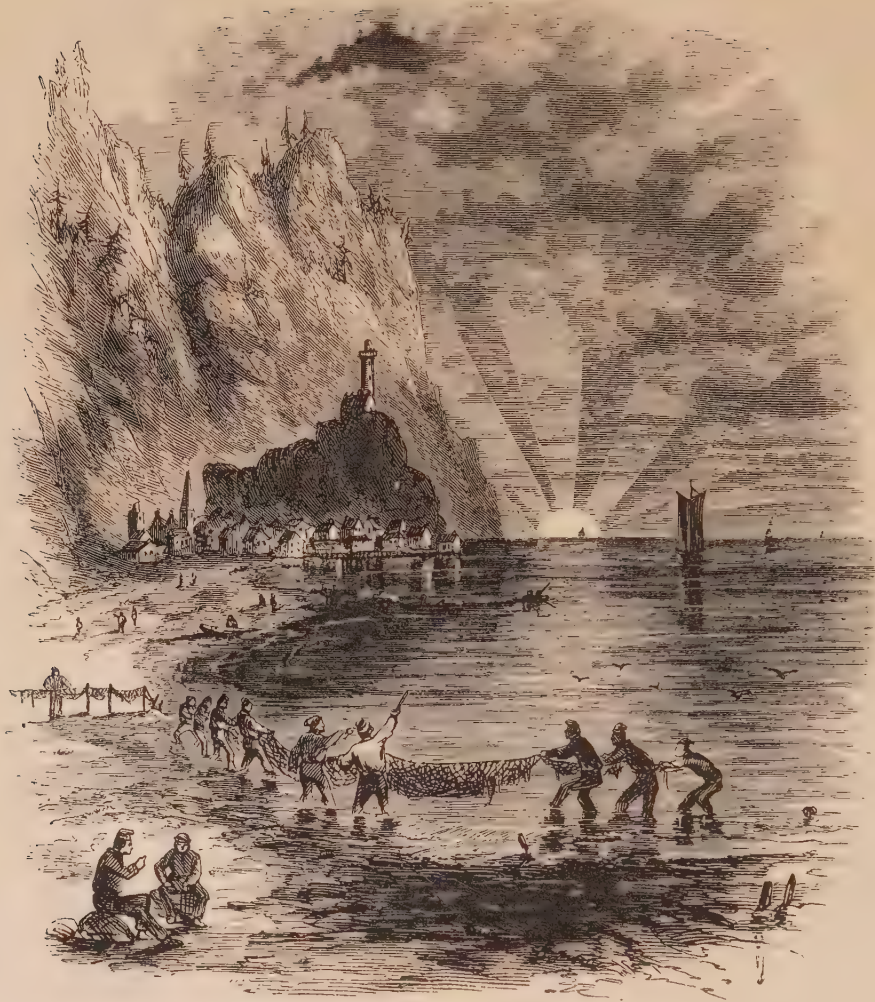


WESTMAN ISLES.

Of the Westman Islands, he says : "Towards noon we made the Westman Isles, a small rocky group some ten miles distant from the main island. A fishing and trading establishment, owned by a company of Danes, is located

son, with his wife and children, and the rest of the prisoners, was sold into slavery in Algiers. The account of his sufferings and privations, which he wrote in the Icelandic language, was afterwards translated and published in Danish.

It was not until 1636, nine years after their capture, that the unfortunate Heimaeyers were released, and then only by being ransomed by the King of Denmark. Such was the misery they had endured from their barbarous taskmasters, that only thirty-seven of the whole number survived, and of these but thirteen lived to return to their native island.



FISHING IN NORWAY.

CHAPTER IX.

FROM DRONTHEIM TO THE NORTH CAPE.

Mild Climate of the Norwegian Coast.—Its Causes.—The Norwegian Peasant.—Norwegian Constitution.—Romantic coast Scenery.—Drontheim.—Greiffenfeld Holme and Väre.—The Sea-eagle.—The Herring-fisheries.—The Lofoten Islands.—The Cod-fisheries.—Wretched Condition of the Fishermen.—Tromsø.—Altenfiord.—The Copper Mines.—Hammerfest the most northern Town in the World.—The North Cape.

OF all the lands situated either within or near the Arctic Circle none enjoys a more temperate climate than the Norwegian coast. Here, and nowhere else throughout the northern world, the birch and the fir-tree climb the mountain-slopes to a height of 700 or 800 feet above the level of the sea, as far as the

to be abroad, as he wanders from farm to farm, so that the most distant families have the benefit of his instruction. Every town has its public library, and in many districts the peasants annually contribute a dollar towards a collection of books, which, under the care of the priest, is lent out to all subscribers. No Norwegian is confirmed who does not know how to read, and no Norwegian is allowed to marry who has not been confirmed. He who attains his twentieth year without having been confirmed has to fear the House of Correction. Thus ignorance is punished as a crime in Norway, an excellent example for far richer and more powerful nations.

The population of Norway amounts to about 1,350,000, but these are very unequally distributed; for while the southern province of Aggerhuus has 513,000 inhabitants on a surface of 35,200 square miles, Nordland has only 59,000 on 16,325, and Finmark, the most northern province of the land, but 38,000 on 29,925, or hardly more than one inhabitant to every square mile. But even this scanty population is immense when compared with that of Eastern Siberia or of the Hudson's Bay territories, and entirely owes its existence to the mildness of the climate and the open sea, which at all seasons affords its produce to the fisherman.

It is difficult to imagine a more secluded, solitary life than that of the "bonders," or peasant proprietors, along the northern coasts of Norway. The farms, confined to the small patches of more fruitful ground scattered along the fjords, at the foot or on the sides of the naked mountains, are frequently many miles distant from their neighbors, and the stormy winter cuts off all communication



NORWEGIAN FARM.



MIDNIGHT SUN OFF SPITZBERGEN.

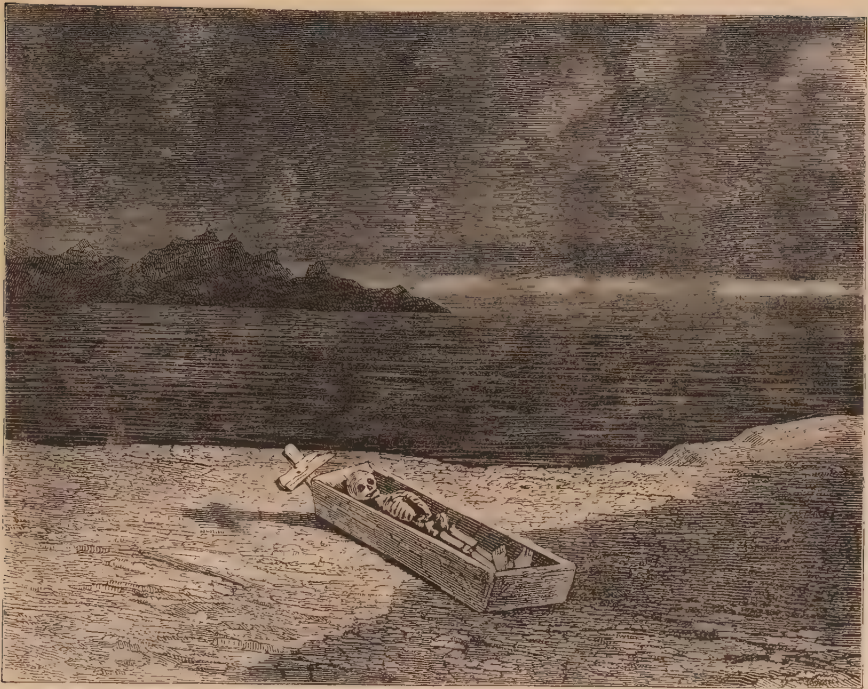
CHAPTER X.

SPITZBERGEN—BEAR ISLAND—JAN MEYEN.

The west Coast of Spitzbergen.—Ascension of a Mountain by Dr. Scoresby.—His Excursion along the Coast.—A stranded Whale.—Magdalena Bay.—Multitudes of Sea-birds.—Animal Life.—Midnight Silence.—Glaciers.—A dangerous Neighborhood.—Interior Plateau.—Flora of Spitzbergen.—Its Similarity with that of the Alps above the Snow-line.—Reindeer.—The hyperborean Ptarmigan.—Fishes.—Coal.—Drift-wood.—Discovery of Spitzbergen by Barentz, Heemskerck, and Ryp.—Brilliant Period of the Whale-fishery.—Coffins.—Eight English Sailors winter in Spitzbergen, 1630.—Melancholy Death of some Dutch Volunteers.—Russian Hunters.—Their Mode of wintering in Spitzbergen.—Scharostin.—Walrus-ships from Hammerfest and Tromsø.—Bear or Cherie Island.—Bennet.—Enormous Slaughter of Walruses.—Mildness of its Climate.—Mount Misery.—Adventurous Boat-voyage of some Norwegian Sailors.—Jan Meyen.—Beerenberg.

THE archipelago of Spitzbergen consists of five large islands: West Spitzbergen, North-east Land, Stans Foreland, Barentz Land, Prince Charles Foreland; and of a vast number of smaller ones, scattered around their coasts. Its surface is about equal to that of two-thirds of Scotland; its most southern point ($76^{\circ} 30' \text{ N. lat.}$) lies nearer to the Pole than Melville Island; and Ross Islet, at its northern extremity ($80^{\circ} 49' \text{ N. lat.}$), looks out upon the unknown ocean, which perhaps extends without interruption as far as the Straits of Bering.

Of all the Arctic countries that have hitherto been discovered, Grinnell



BURIAL IN SPITZBERGEN.

hardened earth—still bear witness to those busy times, and also to the great mortality among the fishermen, caused doubtless by their intemperate habits. They are particularly abundant at Smeerenberg, where Admiral Beechey saw upwards of one thousand of them; boards with English inscriptions were erected over a few, but the greater number were Dutch, and had been deposited in the eighteenth century. Some coffins having been opened, the corpses were found in a state of perfect preservation, and even the woollen caps and stockings of the mariners, who might perhaps have rested for more than a century *on* this cold earth, were still apparently as new as if they had been but recently put on.

In the seventeenth century the English and the Dutch made several attempts to establish permanent settlements in Spitzbergen. The Russia Company tried to engage volunteers by the promise of a liberal pay, and as none came forward, a free pardon was offered to criminals who would undertake to winter in Bell Sound. A few wretches, tired of confinement, accepted the proposal, but when the fleet was about to depart, and they saw the gloomy hills, and felt the howling north-eastern gales, their hearts failed them, and they entreated the captain who had charge of them to take them back to London and let them be hanged. Their request to be taken back was complied with, but the company generously interceded for them, and obtained their pardon.

Some time after, in the year 1630, an English whaler landed eight men in Bell Sound to hunt reindeer. They remained on shore during the night, but meanwhile a storm had arisen, and on the following morning their ship had

seasons, or perhaps once in every three or four summers, when the persecuted animals get a little time to breed and replenish their numbers.

CHASE OF THE WALRUS.



About midway between Hammerfest and Spitzbergen lies Bear Island, originally discovered by Barentz on June 9, 1596. Seven years later, Stephen Ben-

and towards the south it terminates in a solitary hill to which the first discoverers gave the appropriate name of Mount Misery. At the northern foot of this terrace-shaped elevation the plateau is considerably depressed, and forms a kind of oasis, where grass (*Poa pratensis*), enlivened with violet cardamines and white polygonums and saxifragas, grows to half a yard in height. The general character of the small island is, however, a monotony of stone and morass, with here and there a patch of snow, while the coasts have been worn by the action of the waves into a variety of fantastic shapes, bordered in some parts by a flat narrow strand, the favorite resort of the walrus, and in others affording convenient breeding-places to hosts of sea-birds. In Coal Bay, four parallel seams of coal, about equidistant from each other, are visible on the vertical rock-walls, but they are too thin to be of any practical use.

Bear Island has no harbors, and is consequently a rather dangerous place to visit. During the first expedition sent out from Hammerfest, it happened that some of the men who had been landed were abandoned by their ship, which was to have cruised along the coast while they were hunting on shore. But the current, the wind, and a dense fog so confused the ignorant captain that, leaving them to their fate, he at once returned to Hammerfest. When the men became aware of their dreadful situation, they determined to leave the island in their boat, and taking with them a quantity of young walrus flesh, they luckily reached Northkyn after a voyage of eight days. It seems almost incredible that these same people immediately after revisited Bear Island in the same ship, and



A GLIMPSE OF JAN MEYEN'S ISLAND.

claims their assistance a friendly welcome. Villages consisting of several huts, or yourts, are rare, and found only between Jakutsk and the Aldan, where the population is somewhat denser. Beyond the Werchojansk ridge the solitary huts are frequently several hundred versts apart, so that the nearest neighbors sometimes do not see each other for years.

In summer the Jakut herdsmen live in *urossy*, light conical tents fixed on poles and covered with birch rind, and during the whole season they are perpetually employed in making hay for the long winter.

In 62° N. lat., and in a climate of an almost unparalleled severity, the rearing of their cattle causes them far more trouble than is the case with any other pastoral people. Their supply of hay is frequently exhausted before the end of the winter, and from March to May their oxen must generally be content with willow and birch twigs or saplings.



A JAKUT VILLAGE.

At the beginning of the cold season the Jackut exchanges his summer tent for his warm winter residence, or yourt, a hut built of beams or logs, in the form of a truncated pyramid, and thickly covered with turf and clay. Plates of ice serve as windows, and are replaced by fish-bladders or paper steeped in oil, as soon as the thaw begins. The earthen floor, for it is but rarely boarded, is generally sunk two or three feet below the surface of the ground. The seats and sleeping berths are ranged along the sides, and the centre is occupied by the *tschuwal*, or hearth, the smoke of which finds its exit through an aperture in the roof. Clothes and arms are suspended from the walls, and the whole premi-



PETROPAVLOSK.

Besides some Jakut immigrants, the chief stock of the scanty population of the country consists of the descendants of the primitive Kamchatkans, who, in spite of frequent intermarriages with their conquerors the Cossacks, have still retained many of their ancient manners. They are of a small stature, but broad-shouldered, their cheek-bones are prominent, their jaws uncommonly broad and projecting, their noses small, their lips very full, their hair black. The color of the men is dark brown, or sometimes yellow; the women have fairer complexions, which they endeavor to preserve by means of bears' guts, stuck upon their faces in spring with fresh lime, so as not to be burned by the sun. They also paint their cheeks with a sea-weed, which, when rubbed upon them with fat, gives them a beautiful red color.

The Kamchatkans are a remarkably healthy race. Many of them attain an age of seventy or eighty years, and are able to walk and to work until their



FORT ST. MICHAEL.

CHAPTER XXVI.

ALASKA.

Purchase of Alaska by the United States.—The Russian American Telegraph Scheme.—Whymper's Trip up the Yukon.—Dogs.—The Start.—Extempore Water-filter.—Snow-shoes.—The Frozen Yukon.—Under-ground Houses.—Life at Nulato.—Cold Weather.—Auroras.—Approach of Summer.—Breaking-up of the Ice.—Fort Yukon.—Furs.—Descent of the Yukon.—Value of Goods.—Arctic and Tropical Life.—Moose-hunting.—Deer-corrals.—Lip Ornaments.—Canoes.—Four-post Coffin.—The Kenaian Indians.—The Aleuts.—Value of Alaska.

IN 1867 the Russian Government sold to the United States all of its possessions in America, comprising an area of more than 500,000 square miles, equal in extent to France, Germany, and Great Britain, stretching from $54^{\circ} 40'$ north latitude to the Arctic Ocean. The sum paid was about seven and a quarter millions of dollars. In this purchase is included Mount St. Elias, the highest peak in North America, rising to a height of more than 18,000 feet, and one of the loftiest single peaks on the globe. The real value of this new acquisition was quite unknown to both buyer and seller. In the southern part, and on the islands, there is considerable vegetation and forests of large trees; and it is said that there is some mineral wealth. But the greater part of the territory is essentially Arctic. It now bears the designation of the Territory of Alaska, an abbreviation of Aliaska, the name of the peninsula stretching into the North Pacific Ocean.

Little information has as yet been gained of this region. The most important is the result of a journey up the River Yukon, performed in 1866 by Mr. Frederick Whymper, an artist connected with the Telegraph Expedition. This telegraph enterprise was undertaken in the confident expectation that the ca-

as the *Lupinus nootkeanus* and the *Rhododendron kamtschadaticum*, decorate these dismal regions with their brilliant color. The lively green of the meadows reminds one of the valley of Urseren, so well known to all Alpine tourists,



The mosses and lichens begin already at Unalaska to assume that predominance in the Flora which characterizes the frigid zone.

A few degrees to the north of the Aleutian chain, which extends in a long

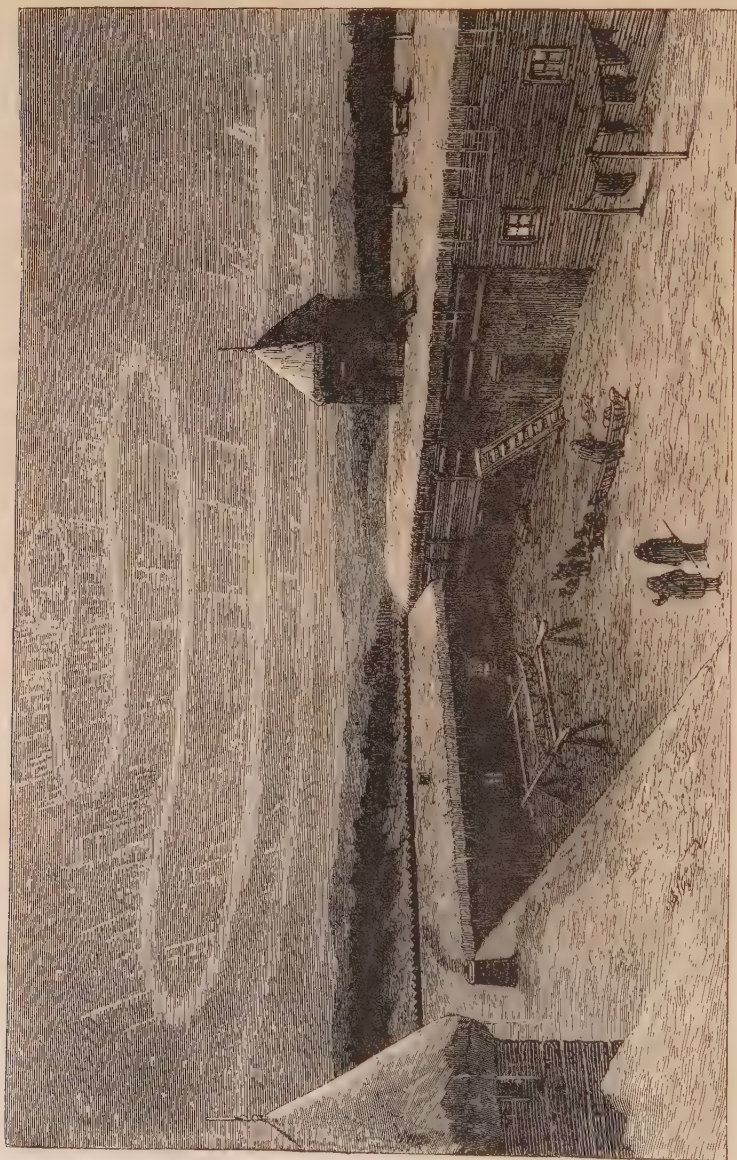


sledges. The men would go on ahead for a space, then return and start on again, thus traversing the distance three times. Often they could not accomplish more than ten miles a day.



At noon on the 11th of November, a fortnight after starting, they caught in the distance a glimpse of a faint bluish streak, varying the white monotony

tear in your fur or woollen clothing makes you aware of its existence, and one's nose, ears, and angles generally are the special sufferers." One day when the thermometer stood at 10° , an expedition started off for the coast : and once when it was at 32° , a half-clad Indian came to the post with his child, no better



AURORA AT NULATO.

clad, bringing some game ; he did not seem to think the day remarkably cold. The shortest day of the winter was December 21, when the sun was an hour and fifty minutes above the horizon.

During the winter Mr. Whymper made many capital sketches out-of-doors, while the temperature was sixty degrees below freezing-point. Among these

is a remarkable aurora borealis on the 21st of December. It was not the conventional arch, but a graceful, undulating, ever-changing snake of pale electric



light; evanescent colors, pale as those of a lunar rainbow, ever and again flitting through it, and long streamers and scintillations moving upward to the bright stars, which shone distinctly through its hazy ethereal form. The night

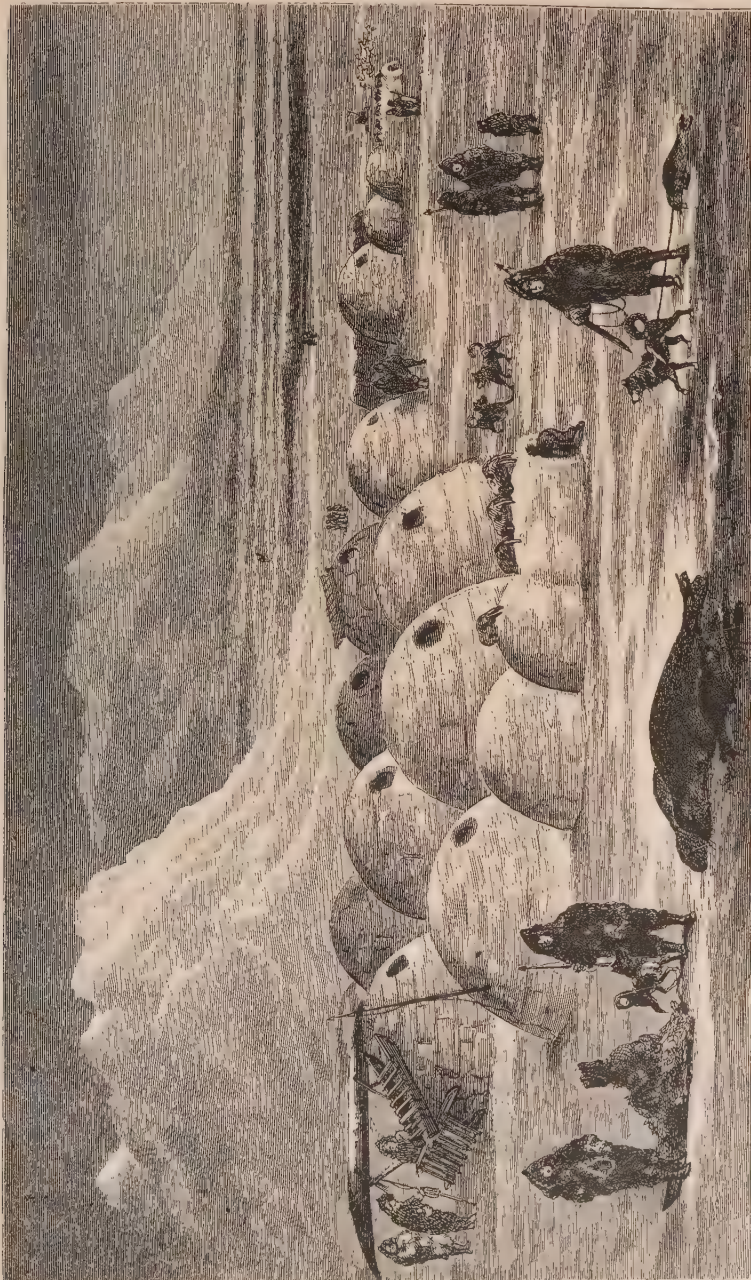


HALL AND COMPANIONS, IN INUIT COSTUME.

by any other white man capable of telling what he saw, and a part of which he was. The remarkable book in which Mr. Hall describes his expedition* seems not to have come under the notice of Dr. Hartweg. It is proposed in this chapter to supplement the account of the Innuits from this work of Mr. Hall.

* *Arctic Researches, and Life among the Esquimaux.* By CHARLES FRANCIS HALL. New York, 1866.

cility afforded by their inhospitable country. Of their igloos or snow-houses we have already spoken. In half an hour a couple of men will build one of these, which answers very well for a temporary shelter. When one is to be built for a longer residence, more care is taken in the construction. A site is chosen where the snow is hard—if possible, over a running stream, so that they



INNUIT IGLOOS.



SPEARING THE WALRUS.

lance. Should the Inuit fail to slip off the coil in time, he would infallibly be drawn into the water, and almost certainly lose his life; but as Hall records no instance of such a catastrophe, we infer that these rarely happen.

The Inuits show remarkable ingenuity in availing themselves of every fa-

he was twenty hours in getting through them, and certainly did not consider the quantity extraordinary.

	lbs.	oz.
Sea-horse flesh, hard frozen.....	4	4
“ “ boiled.....	4	4
Bread and bread-dust.....	1	12
Total of solids.....	10	4

The fluids were in fair proportion, viz., rich gravy soup, $1\frac{1}{2}$ pint; raw spirits, 3 wine-glasses; strong grog, 1 tumbler; water, 1 gallon 1 pint.*

Kane averages the Esquimaux ration in a season of plenty at eight or ten pounds a day, with soup and water to the extent of half a gallon, and finds in this excessive consumption—which is rather a necessity of their peculiar life and organization than the result of gluttony—the true explanation of the scarcity from which they frequently suffer. In times of abundance they hunt indomitably without the loss of a day, and stow away large quantities of meat. An excavation is made either on the mainland—or, what is preferred, on an island inaccessible to foxes—and the flesh is stacked inside and covered with heavy stones. One such cache which Kane met on a small island contained the flesh of ten walruses, and he knew of others equally large. But by their ancient custom, all share with all; and as they migrate in numbers as their necessities prompt, the tax on each particular settlement is not seldom so excessive that even considerable stores are unable to withstand the drain, and soon make way for pinching hunger, and even famine.

* Captain Hall, who in his search after the remains of the Franklin expedition has now spent several years among the Esquimaux, has so far acquired their appetite that he is able to consume 9 lbs. of meat a day without any inconvenience.

CHAPTER XXVIII.

THE FUR-TRADE OF THE HUDSON'S BAY TERRITORIES.

The Coureur des Bois.—The Voyageur.—The Birch-bark Canoe.—The Canadian Fur-trade in the last Century.—The Hudson's Bay Company.—Bloody Feuds between the North-west Company of Canada and the Hudson's Bay Company.—Their Amalgamation into a new Company in 1821.—Reconstruction of the Hudson's Bay Company in 1863.—Forts or Houses.—The Attihawmeg.—Influence of the Company on its savage Dependents.—The Black Bear, or Baribal.—The Brown Bear.—The Grizzly Bear.—The Raccoon.—The American Glutton.—The Pine Marten.—The Pekan, or Woodshock.—The Chinga.—The Mink.—The Canadian Fish-otter.—The Crossed Fox.—The Black or Silvery Fox.—The Canadian Lynx, or Pishu.—The Ice-hare.—The Beaver.—The Musquash.

AS the desire to reach India by the shortest road first made the civilized world acquainted with the eastern coast of North America, so the extension of the fur-trade has been the chief, or rather the only, motive which originally led the footsteps of the white man from the Canadian Lakes and the borders of Hudson's Bay into the remote interior of that vast continent.

The first European fur-traders in North America were French Canadians—*coureurs des bois*—a fitting surname for men habituated to an Indian forest-life. Three or four of these "irregular spirits" agreeing to make an expedition into the backwoods would set out in their birch-bark canoe, laden with goods received on trust from a merchant, for a voyage of great danger and hardship, it might be of several years, into the wilderness.

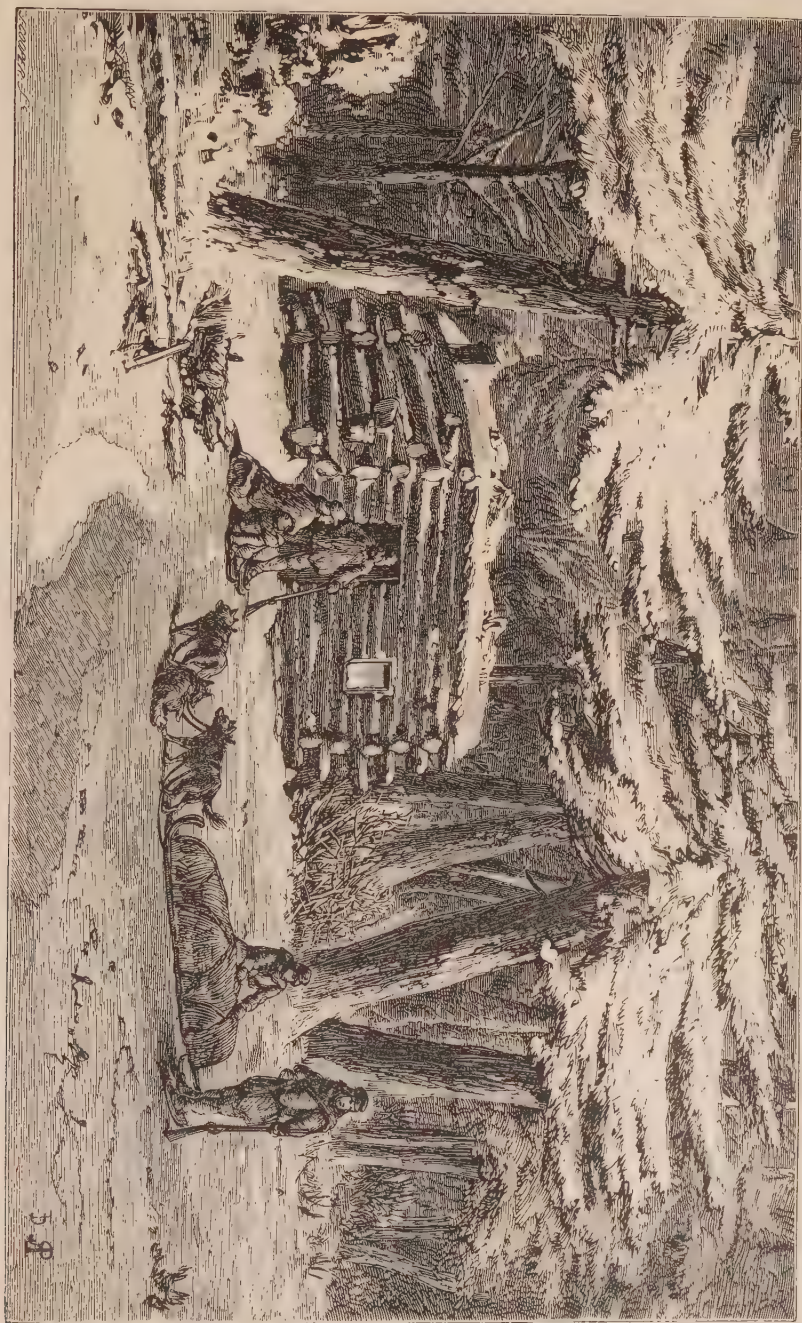
On their return the merchant who had given them credit of course received the lion's share of the skins gathered among the Hurons or the Iroquois; the small portion left as a recompense for their own labor was soon spent, as sailors spend their hard-earned wages on their arrival in port; and then they started on some new adventure, until finally old age, infirmities, or death prevented their revisiting the forest.

The modern "*voyageur*," who has usurped the place of the old "*coureurs*," is so like them in manners and mode of life, that to know the one is to become acquainted with the other. In short, the *voyageur* is merely a *coureur* subject to strict law and serving for a fixed pay; while the *coureur* was a *voyageur* trading at his own risk and peril, and acknowledging no control when once beyond the pale of European colonization.

The camel is frequently called the "ship of the desert," and with equal justice the birch-bark canoe might be named the "camel of the North American wilds." For if we consider the rivers which, covering the land like a net-work, are the only arteries of communication; the frequent rapids and cataracts; the shallow waters flowing over a stony ground whose sharp angles would infallibly cut to pieces any boat made of wood; and finally the surrounding deserts, where, in case of an accident, the traveller is left to his own resources, we must come to the conclusion that in such a country no intercourse could possibly be

crease of their expenditure; and thus the Hudson's Bay Company, which used to gratify its shareholders with dividends of 50 and 25 per cent., was unable,

WINTER HUT OF HUNTERS.



from 1808 to 1814, to distribute a single shilling among them. At length wisdom prevailed over passion, and the enemies came to a resolution which, if

amounts to about £150,000 or £200,000. Besides, many of its furs are bartered for Russian-American peltry, and a large quantity is exported direct to China.



SWAMP FORMED BY DESERTED BEAVER-DAM.

After this brief account of one of the most remarkable mercantile associations of any age, some remark on the chief fur-bearing animals of the Hudson's

er. As its toes are connected by a small web, it is an excellent swimmer, and as formidable to the salmon or trout in the water as to the hare on land.

The Canadian fish-otter (*Lutra canadensis*) far surpasses the European species, both in size and in the beauty of its glossy brown skin. It occurs as far northward as 66° or 67° lat., and is generally taken by sinking a steel trap near the mouth of its burrow. It has the habit of sliding or climbing to the top of a ridge of snow in winter, or of a sloping moist bank in summer, where, lying on the belly, with the fore feet bent backward, it gives itself with the hind legs an impulse which sends it swiftly down the eminence. This school-boy sport it continues for a long time.

The red fox (*Vulpes fulvus*), which is found throughout the Hudson's Bay territories, has likewise a much finer fur than our common fox. It is of a bright ferruginous red on the head, back, and sides; beneath the chin it is white, while the throat and neck are of a dark gray, and the under parts of the body, toward the tail, are of a very pale red. The crossed fox (*Canis decussatus*), thus named from the black cross on its shoulders, is still more valuable; its skin—the color of which is a sort of gray, resulting from the mixture of black and white hair—being worth four or five guineas. Peltry still more costly is furnished by the black or silvery fox (*Canis argentatus*), whose copious and beautiful fur is of a rich and shining black or deep brown color, with the longer or exterior hairs of a silvery white. Unfortunately it is of such rare occurrence that not more than four or five are annually brought to a trading-post.

The Canada lynx, or pishu (*Lynx canadensis*), is smaller than the European species, but has a finer fur, those skins being most valued which approach to a pale or whitish color, and on which the spots are most distinct. It chiefly feeds on the hare (*Lepus americanus*), which is not much larger than a rabbit, and is found on the banks of the Mackenzie as far north as 68° or 69°.

Still nearer to the Pole, the ice-hare (*Lepus glacialis*) ranges as far as the Parry Islands (75° N. lat.), where it feeds on the arctic willow, and other high northern plants. Its favorite resorts are the stony districts, where it easily finds a refuge; in winter it burrows in the snow. In summer its back is grayish white, but as the cold increases, it becomes white, with the exception of the tips of the ears, which remain constantly black.

Formerly the beaver (*Castor fiber*) was the most important of the fur-bearing animals of the Hudson's Bay territories. In the year 1743, 127,000 beaver skins were exported from Montreal to La Rochelle, and 26,700 by the Hudson's Bay Company to London. At present, the exportation hardly amounts to one-third of this quantity. As the beaver chiefly lives on the banks of the willow, the beech, and the poplar, it is not found beyond the forest region; but along the banks of the Mackenzie it reaches a very high latitude.

The musk-rat, ondatra or musquash (*Fiber zibethicus*)—which is about the size of a small rabbit, and of a reddish-brown color—is called by the Indians the younger brother of the beaver, as it has similar instincts. Essentially a bank-haunting animal, it is never to be seen at any great distance from the water, where it swims and dives with consummate ease, aided greatly by the webs which connect the hinder toes. It drives a large series of tunnels into

the bank, branching out in various directions, and having several entrances, all of which open under the surface of the water. If the animal happens to live upon a marshy and uniformly wet soil, it becomes a builder, and lives in curiously-constructed huts, from three to four feet in height, plastered with great neatness in the inside, and strengthened externally with a kind of basket-work of rushes, carefully interlaced together. The judgment of the animal shows itself in the selection of the site, invariably choosing some ground above the reach of inundation, or else raising its hut on an artificial foundation; for, though obliged to reside near flat, submerged banks, where the soft soil is full of nourishing roots, it requires a dry home to rest in.

In winter the musquash villages—for the huts are sometimes built in such numbers together as to deserve that name—are generally covered with thick snow, under which this rodent is able to procure water, or to reach the provisions laid up in its storehouse. Thus it lives in ease and plenty, for the marten is too averse to the water, and the otter too bulky to penetrate into its tunnels. But when the snow melts, and the huts of the musquash appear above the ground, the Indian, taking in his hand a large four-barbed spear, steals up to the house, and driving his weapon through the walls, is sure to pierce the animals inside. Holding the spear firmly with one hand, he takes his tomahawk from his belt, dashes the house to pieces, and secures the inmates. Another method employed by the Indians to capture the musquash is to block up the different entrances to their tunnels, and then to intercept the animals as they try to escape. Sometimes the gun is used, but not very frequently, as the musquash is so wary that it dives at the least alarm, and darts into one of its holes. The trap, however, is the ordinary means of destruction. The soft and glossy fur of the musquash, though worth no more than from 6*l.* to 9*l.*, is still a not inconsiderable article of trade, as no less than half a million skins are annually imported into England for hat-making; nor is there any fear of the musquash being extirpated, in spite of its many enemies, as it multiplies very fast, and is found near every swamp or lake with grassy banks as far as the confines of the Polar Sea.

THE TROPICAL WORLD.



WATERSPOUT.

CHAPTER I.

THE OCEAN AND ATMOSPHERE OF THE TROPICAL WORLD.

Characteristics of the Polar and Tropical Worlds—Geographical and Climatic Limits of the Zones—Distribution of Land and Water—Climatic Importance of the Ocean—Currents of the Ocean—The Gulf Stream—Influence of the Gulf Stream upon the Climate of Europe—The Sargasso Sea—Columbus and the Gulf Stream—The Pacific and Indian Currents—Heat and Force—Relative Positions of Hot and Cold Currents—Currents of the Air—The Trade Winds—Atmospheric Currents and Climate—The Calm Belt near the Equator—Rainfall of Different Regions—Rainy and Dry Seasons within the Tropics—The Monsoons—Winds as Regulators of Rains—Annual Rainfall—Whirlwinds—Their Rotary Motion—Tropical Islands—Volcanic Islands—Coralline Islands—Atolls and Reefs—Influence of the Ocean upon Life in the Tropical Islands.

FROM a wide survey of the Polar World, we now turn to the tropical regions, where nature assumes aspects of an entirely different character. In the Polar World there is a constant struggle between all sorts of life and cold. As we approach the poles, cold gains more and more the mastery; life nearly ceases upon the land,

CHAPTER II.

TABLE LANDS AND PLATEAUS OF THE TROPICAL WORLD.

Influence of Elevation upon Climate.—*The Puna of Peru*: Squier's Description of the Puna—The Soroche or Veta—View from La Portada—Effects of the Soroche—The Sarumpe—The Veruga Water—Effects of the Veta on Animals—Vegetation of the Puna—The Llama—The Huanacu—The Alpaca—The Vicuna—Hunting the Vicuna—The Hunts of the Ancient Incas—Enemies of the Vicuna—Other Native Animals—The Ox, Horse, Mule and Sheep—Waterfowl—Warm Valleys—Rapid Change of Climate According to Elevation.—*Lake Titicaca*: The Sacred Island of Titicaca—Manco Capac, the First Inca—His Journey from Lake Titicaca to Cuzco—Fact and Myth respecting Manco Capac—Extent of the Inca Empire—Inca Civilization originated in the Puna, near Lake Titicaca—The Sacred Rock on the Island—Ruins and Relics on the Island—The Hacienda on the Island—The Eve of St. John—The Bath of the Incas—Other Sacred Islands—Ruins at Tihuanico—Some more ancient than the Incas—Immense Monolithic Gateways and Hewn Stones—Inca Civilization—The Great Military Roads—System of Posts and Post-Stations.—*The Valley of Quito*: Approach to the Valley from the Pacific Coast—A Tropical Region—Climbing the Cordillera—Scenes by the Way—Quito—Climate of the Valley—Astronomical Site—Trees, Fruits, Vegetables, and Flowers—Animals—Birds—Insects, Reptiles, and Fish—The Population of the Valley—Indians—Half-Breeds—Whites—Courtesy of the People—A Polite Message—Scenery of the Valley—Volcanoes—Imbabura—Destruction of Otovalo—Cayamba—Guamani—Antisana—Sincholagua—Cotopaxi—The Inca's Head—Tunguragua—Altar—Sangai—Its Perpetual Eruption—Chimborazo—Caraguarizo—Illinza—Corazon—Pichincha—Its immense Crater—Descent into the Crater—Eruptions of Pichincha.—*The Table-Land of Bogotá*: Voyage up the Magdalena—Ascent to the Plateau—Bogotá and the Bogotáños—Traveling at Bogotá.—*Table-Land of Mexico*: Its Extent—The Tierra Caliente—The Tierra Templada—The Tierra Fria—The Valley of Anahuac—The Volcanoes of Orizaba, Popocatepetl, Iztacihuatl, and Toluca.—*The Sikkim Slope*: Approach and Ascent—Dorjiling—The Sikkim Peaks—Altitude of Kinchin-junga—Flight of the Condor.

WITHIN the geographical limits of the Tropical World is found every variety of climate upon the globe. There are great mountain ranges which even at the equator rise above the limits of perpetual snow. Their summits, untrodden by man and unvisited by any other form of animal life, must be more desolate than the extremest polar regions to which explorers have been able to penetrate. Of living creatures the strong-winged condor only has reached so high. Then, below these, yet rising far into the air, are broad plateaus whose desolate character reminds one of the tundras of Siberia and the wastes stretching across the American continent from Hudson's Bay to Behring's Straits.

One of the most notable of these lofty tropical plateaus is that extending between the parallel mountain chains of the Cordilleras in South America. It is known as the *Puna* or *Altos* of Peru. In the popular language of the region a part of it is called

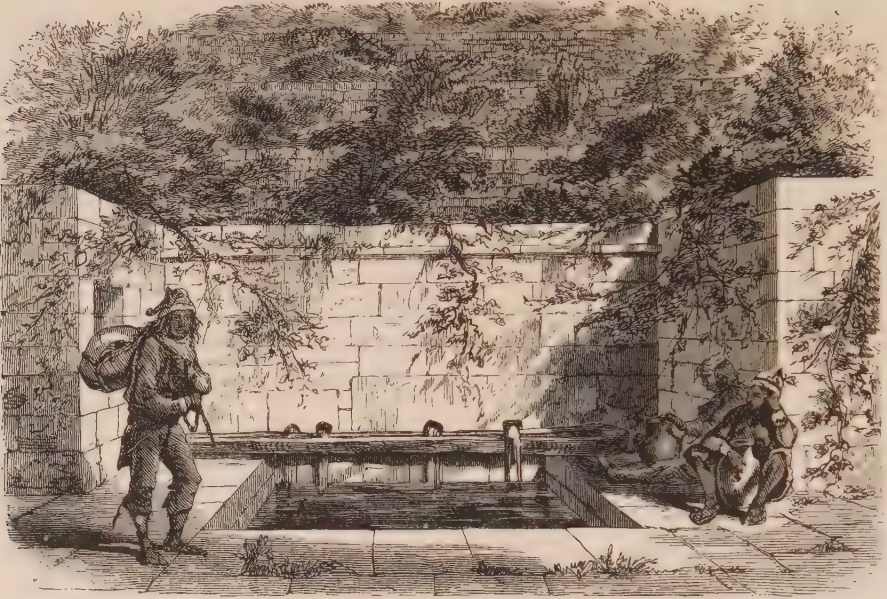
the *Despoblado*, or "Uninhabited." It extends through a great part of the length of Peru and Bolivia, at a height of from ten to fourteen thousand feet above the level of the sea. "It is," says Squier, "that cold and rugged region which forms the broad summit of the Cordillera. It has the aspect of an irregular plain, and is diver-



THE PUNA OF PERU.

sified with mountain ridges and snowy volcanic peaks, imposing in their proportions, notwithstanding that they rise from a level of 14,000 feet above the sea." Squier, in a few graphic sentences, describes the varying aspects of nature as one climbs up the ascent of the Puna: "Pacla is a poor but picturesque little village, with a small, white church gleaming out against the dull brown of the bare mountain side. It is 9,700 feet above the sea. There were some scant fields of maize and lucern around it, and the lower slopes of the mountains were thinly sprinkled with stems of the columnar cactus." Still ascending, "our mules began to pant under the influence of the *soroche* or rarification of the air, but which the drivers insisted was from the *veta*, or influence due to the *vetas* or veins of metal in the earth. At La Portada, 12,600 feet above the level of the sea, and 1,000 feet higher than the Hospice of the Grand St. Bernard, I witnessed a scene more wild and desolate than I have beheld in crossing the Alps by the routes of the Simplon, the Grand St. Bernard, or the St. Gothard. There is neither tree nor shrub; the frosty soil cherishes no grass, and the very lichens find scant hold on the bare rocks. The aguardiente, or native rum, which I had purchased for making a fire for preparing my coffee, refused to burn, and extinguished the lighted match thrust into it, as if it were water. I was obliged to abstract some

needed perhaps with our visit. We ascertained, however, that this was the Eve of St. John, which is celebrated in this way throughout the Sierra. On that night fires blaze on the hill-tops in all the inhabited districts of Peru and Bolivia, from the desert of Atacama to the Equator." Thus have the rites of Christianity superseded the old worship of the Incas.



FOUNTAIN OF THE INCAS.

The Fountain of the Incas is situated in a sheltered nook, surrounded with terraces upon which grow patches of maize with ears not longer than one's finger. The bath itself is a pool forty feet long, ten wide, and five deep, built of worked stones. Into this pour four jets of water, as large as a man's arm, from openings cut in the stones behind. "The water comes through subterranean passages from sources now unknown, and never diminishes in volume. It flows to-day as freely as when the Incas resorted here and cut the steep hill-sides into terraces, bringing the earth all the way from the Valley of Yucay, or 'Vale of Imperial Delights,' four hundred miles distant. Over the walls droop the tendrils of vines; and what with the odors and the tinkle and patter of the water, one might imagine himself in the court of the Alhambra."

Besides the sacred island of Titicaca, there are eight smaller ones in the lake. Soto was the Isle of Penitence, where the Incas were wont to resort for fasting and humiliation. Coati was sacred to the moon, the wife and sister of the sun, and on it is the palace of the Virgins of the Sun, one of the most remarkable and best preserved remains of aboriginal architecture on the continent of America.

At Tihuanico, on the border of the lake, are immense ruins which clearly antedate the time of the Incas. They were ruins when the Spaniards made their appearance, and the natives could give no account of them. They supposed that they were built

by divine architects in a single night. Cieza de Leon, one of the companions of Pizarro, writes of them : " What most surprised me was that the enormous gateways were formed on other great masses of stone, some of which were thirty feet long, fifteen wide, and six thick. I can not conceive with what tools or instruments these stones were hewn out, for they must have been vastly larger than we now see them. It is supposed that some of these structures were built long before the dominion of the Incas ; and I have heard the Indians affirm that these sovereigns constructed their great building at Cuzco after the plans of the walls of Tihuanico." The most remarkable thing in these ruins are the great doorways of a single block of stone. The largest of these is ten feet high and thirteen broad, the opening cut through it being six feet four inches high, and three feet two inches wide. The whole neighborhood is strewn with immense blocks of stone elaborately wrought, equalling if not surpassing in size any known to exist in Egypt, India, or any other part of the world. Some of these are thirty feet long, eighteen broad, and six thick.

All these gigantic remains of a past civilization are found in the lofty table-land of the Puna. When these come to be fully described and illustrated, it will be seen that here, in a climate so cold that hardly a vegetable will grow which man can use for food, were planted the seeds of a civilization as remarkable as any which ever existed. More wonderful, perhaps, than these great architectural works were the great military roads constructed by the Incas. One reached from Cuzco down to the ocean. The other stretched from the capital, along the very crest of the Cordilleras, and down their ravines, to Quito, 1,200 miles distant. The length of these great roads, including branches, was not less than 3,000 miles. Modern travelers compare them with the best in the world. They were from 18 to 25 feet broad, paved with immense blocks of stone, sometimes covered with asphaltum. In ascending steep mountains, broad steps were cut in the rock ; ravines were filled with heavy embankments flanked with parapets, and, wherever the climate permitted, lined with shade trees and shrubs, with houses at regular distances for the accommodation of travelers, and especially serving as post stations. For there was a regular postal service by which the Incas could send messages from one extremity of their dominions to the other. This service was performed by runners ; for, as has been said, the Peruvians had no beasts of burden stronger or swifter than the llama. These messengers were trained to great speed. On approaching a station they gave a loud shout to warn the next courier of their approach, so that he might be ready to take the message or parcel without delay. In this manner it is said that dispatches were sent at the rate of 150 miles a day, a speed unequaled until within our own times, when the railway and the telegraph have brought the ends of the world almost together.

Lying lower than the desolate Puna, but more than twice as high as the loftiest summits of Great Britain, and higher by half than the topmost peaks in North America east of the Rocky Mountains, is a series of valleys and table lands which form a marked feature in the Tropical World. The principal of these, going northward from the equator, are those of Quito in Equador, Bogota in Columbia, and Mexico.

The valley of Quito, with a breadth of thirty miles, is two hundred miles in length from north to south, the equator running upon its northern border. It is in reality a great table-land occupying the summit of the Cordilleras, only overtopped and sur-

rounded by a series of peaks the most picturesque, and, after the highest peaks of the Himalayas, among the loftiest on the globe. The valley is 10,000 feet above the level

of the sea, which, by the rule of allowing 300 feet in elevation to be equivalent to a degree of latitude, would give a climate approximating to that of Florida and Georgia; but this is much modified by other circumstances, especially by the snow-clad peaks which surround it, and by the more abundant rainfall.

This lofty valley is approachable by the great Inca road of which we have spoken, leading across the crest of the Cordilleras. But for generations probably no man has ever thus reached it. Some day it will be visited from the east by steaming up the Amazon to the foot of the Andes, and ascending the mountains. At present it is approached from Guayaquil on the Pacific. We will accompany Mr. Orton,* an American traveler, who in 1867-8, at the head of a scientific expedition, made the journey thither; and thence, descending the Amazon, crossed the entire continent almost on the line of the equator. Landing at Guayaquil, the seaport of Ecuador, we embark on a little steamer which carries us seventy miles up the turbid river Guayas. The Eucadorian government, however, does not patronize the steamer, but sends the mails



ASCENDING THE ANDES.

up the river in a canoe. The river runs first through an almost impenetrable jungle; then come vast plantations of cocoa and coffee; then follow groves of oranges, lemons, plantains and mango. Leaving the boat, we hire mules with which to make the ascent of the Andean Cordilleras.† We plunge at once by a narrow path into a dense forest.

*The Andes and the Amazon, by James Orton, Professor in Vassar College, Poughkeepsie, N. Y.

† Cordillera, literally a long ridge, is usually applied to a longitudinal subdivision of the Andes, as the east and west Cordilleras, enclosing the valley of Quito. A Sierra is a jagged spur of the mountains.

resplendent hues, and birds of gorgeous plumage. Many of these birds have notes of exquisite melody. But the malaria engendered by the decomposition of the rank vegetation and the dank soil renders the region one of the most insalubrious upon the globe, and almost uninhabitable by man from the vernal to the autumnal equinox. Here is the birthplace of the dreaded *vomito*, or yellow fever.

Passing this fatal belt, after twenty leagues the traveler finds himself ascending into a purer atmosphere. The vegetation changes at every league. One by one the vanilla, the indigo plant, the sugar cane, and the plantain disappear; until at the height of 4,000 feet the unchanging green of the rich foliage of the liquidamber indicates that the traveler has reached the elevation where the clouds and mists settle in their passage from the Gulf, and maintain a perpetual moisture.

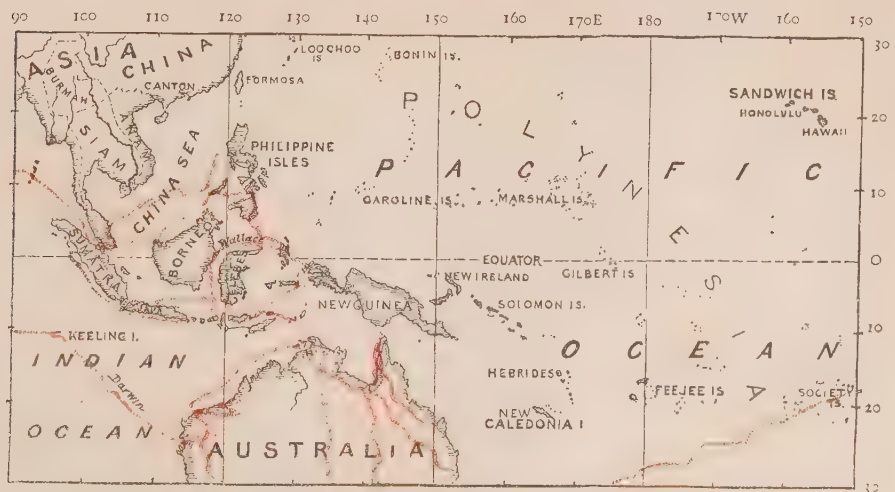
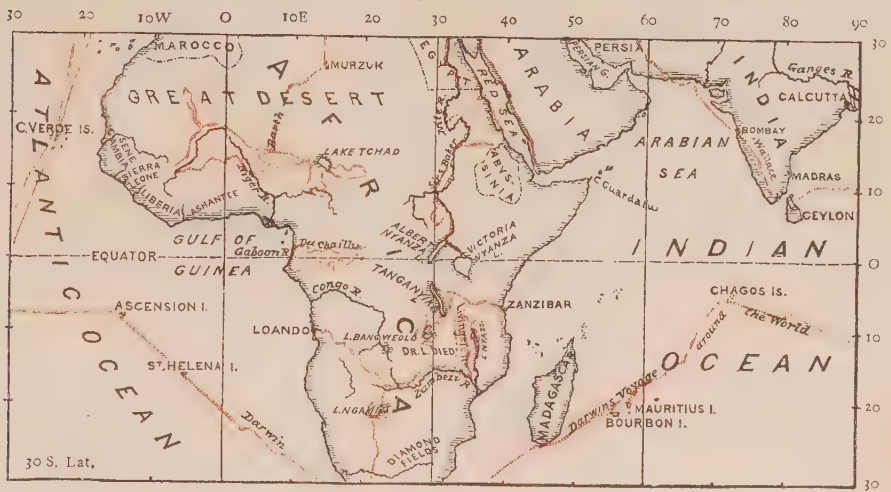
Here are the confines of the *tierra templada*, or temperate region, where the ever-green oaks remind him of the forests of Central Europe. The features of the scenery become imposing. The ascending road sweeps along the base of mighty mountains, now snow-clad, but bearing traces of former volcanic fires. The flanks of the mountains are rent with huge *barancas* or ravines, down whose steep sides he can look for more than a thousand feet. Cactuses, euphorbia, dracæna, and a multitude of other plants cling to the rocky walls; while at the bottom of the gorge, to which he might apparently almost leap, stand huge laurels and fig-trees. Upward still, he passes fields waving with yellow wheat and broad-leaved maize, with plantations of the agave, from which the Mexicans prepare, as they did in the days of the Montezumas, their national beverage of *pulque*.

At an elevation of 8,000 feet, the forests of sombre pine announce that the *tierra fría*, or "cold region," the last of the three great terraces, has been reached. Here in the valley of Anahuac, yet at an elevation of 7,500 feet, rests the city of Mexico, the famous capital of the Montezumas, with its shallow lakes, and surrounded by elliptical plains, enclosed by frowning ridges of basaltic and porphyrite rocks. On the south-eastern side rises the snow-crowned cone of Orizaba, whose ever blazing summit, shining like a star through the darkness of night, gained for it its Aztec name of Citlaltepētēl, "the Mountain of the Star;" farther west rise Popocatepētēl, Iztacihuatl, and Toluca, altogether forming a magnificent volcanic circuit, only equaled by that which girdles the valley of Quito. If the traveler chooses to climb the sides of these volcanoes, in a few days' journey he will have passed through every variety of climate and every zone of production, from the fiercest tropical heat to the confines of perpetual winter; from the towering palm to the lichen which hardly lifts its head above the sterile rock.

Sikkim, on the southern side of the Himalayas, may be considered a vast sloping plain, rising in a gradual ascent from the foot of the chain to the base of the peaks, the highest on the globe. From the shores of the Bay of Bengal is a level plain of a hundred miles in breadth to the foot of the Himalayas. Thence the land rises gently 7,000 feet in eighty miles. Here is the British sanitarium of Dorjiling, where the European debilitated by the burning climate of the lowlands may breathe air as cool and refreshing as those of his native land. Eighty miles further brings him 9,000 feet higher to the limits of perpetual snow. Thence arise more steeply, 12,000 feet higher, the lofty summits, rather than peaks, of the Himalayas, looking down upon

the magnificently wooded region below. The highest of these Sikkim peaks is Kinchin-junga—the third, but until recently believed to be the first, in height upon the globe. It falls but a hundred feet below the Dipsang or Karkakorum peak, and about eight hundred below Gaurisanker, which the British have re-named Mount Everest. Kinchin-junga rises to the altitude of 28,172 feet. Not only is its summit untrodden by man or beast, but nothing that breathes has ever mounted so high into the air. The condor, who in his flight looks down upon the dome of Chimborazo, never mounts to within thousands of feet of the height of Kinchin-junga.*

* Humboldt's statement that the condor flies higher than Chimborazo (21,420 feet) has been questioned. But Orton has seen numbers of them hovering at least a thousand feet above Pichincha (16,000 feet), and does not doubt that they fly much higher. Müller, in his ascent of Orizaba, saw falcons flying fully 18,000 feet high; and it is affirmed that wild geese fly over the peak of Kunchan-ghow (22,000 feet). There can be little doubt that the condor attains an elevation greater than any other bird, and that no other creature ever voluntarily ascends so high.



TROPICAL WORLD.





IGARIPE, OR CANOE-PATH ON THE AMAZON.

CHAPTER IV.

TROPICAL FORESTS.—VALLEY OF THE AMAZON.

Characteristics of the Tropical Forests—Variety of Trees and Plants—Aspect During the Rainy Season—Beauty After the Rainy Season—A Morning Concert—Repose at Noon—Awakening at Evening—Nocturnal Voices of the Forest.—*The Amazon*: Course of the River—Size of its Basin—The Tide at its Mouth—Rising of the River—Igaripes, or Canoe-Paths—Inundations of the Amazon—Vast Variety of its Vegetation—Fishes—Agassiz's Specimens—Alligators and Turtles—Turtle-Hunting—Insects—Ants—Butterflies—Spiders—Lizards—Frogs and Toads—Snakes—Paucity of Mammalia—The Jaguar—Scantiness of Human Population—Indian Tribes—Mundurcu Tattooing—Travelers' Accounts of the Tribes—Men with Tails—Orton's Summary of their Character—His Own Experience Favorable—He finds them Honest and Peaceable—Agassiz's Notices of the Indians—Their Familiarity with Animals and Plants—Whites—Negroes—Mixed Breeds—Agassiz and Orton on the Capacity of Amazonia.

HAVING passed in review the lofty plateaus, the broad savannas, and the burning deserts, which form striking though exceptional features of the Tropical World, we proceed to the forests, which constitute the most distinctive feature of the regions which lie bordering the equator. Reserving for a separate chapter some of the most notable trees specially characteristic of the tropics, we propose to

and illuminate the world. It was, so says the legend, plated all over with gold and silver, and, except upon the most solemn occasions, covered with a vail of cloth of costly materials and gorgeous color. The gold and silver plating and the gorgeous covering have long ago disappeared, and what is now seen is a bare rock, on the crest of the island, which rises 2,000 feet above the waters of the lake. Yet even now, when the Indian guides come within sight of it, they raise their hats, bow reverently, muttering words of mystic import, which they themselves, most likely, only partly comprehend. In front of the rock is a level artificial terrace 372 feet long and 125 feet broad, supported by a low stone wall. According to tradition, the soil which once covered this terrace was conveyed upon the backs of men from the distant valleys of the Amazon, so that it might nourish a vegetation denied by the hard ungrateful soil of the island.

Everywhere on the holy island are the ruins of Inca structures, and the sites of the most sacred spots are still shown. Here is the sheltered bay where the Incas landed when they came to visit the spot consecrated to the sun. Half way up the ascent are the "foot-prints" of the great Inca Tupanqui, marking the spot where he stood when, catching his first view of the hallowed rock, he removed the imperial covering from his head in token of adoration of the divinity whose shrine rose before him. These so-called foot-prints look not unlike the impressions of a gigantic foot, thirty-six inches long and of corresponding breadth. They are formed in outline by hard ferruginous veins around which the softer rock has been worn away, leaving them in relief.

The sacred island of the Incas is now the property of a resident of Puna, a city on the shore of the lake containing 7,000 inhabitants. It is the loftiest spot on the globe which is the site of any considerable town. It stands 12,870 feet above the level of the sea. The mining town of Potosi is indeed 500 feet higher, and there are among the Andes post-stations and farms much higher. The station of Rumihuasi, in the Puna, the loftiest permanently inhabited spot in the New World, is 15,542 feet high—only 242 feet below the summit of Mont Blanc; and the gold mine of Thok Jalung in Thibet is 18,330 feet above the sea. The proprietor of the sacred island has a hacienda close by the "Bath of the Incas." "It consists," says Squier, "of three small buildings, occupying as many sides of a court. One is a kitchen and dormitory, another a kind of granary or storehouse, and in the third is an apartment reserved for the proprietor when he visits the island. The room is neatly whitewashed, the floor matted, and there are two real chairs from Connecticut, and a table that may be touched without falling in pieces. The night was bitterly cold," continues Squier, "and we had no covering except our saddle-cloths, having declined some sheep-skins which the alcalde would have taken from the poor people of the establishment. A sheep-skin, or the skin of a vicuña, spread on the mud floor of his hut, is the only bed of the Indian from one year's end to the other. It is always filthy, and frequently full of vermin. Before going to bed we went out into the frosty, starry night, and were surprised to see fires blazing on the topmost peaks of the island, on the crest of Coati, and on the headland of Copabanca. Others, many of them hardly discernible in the distance, were also burning on the peninsula of Tiquina, and on the bluff Bolivian shores of the lake, their red light shimmering like golden lances over the water. Our first impression was that some mysterious signalling was going on, con-

the Havana, from a smooth, slender, and grass-green shaft, placed like an additional column upon the dark-colored trunk. In the fan-palms, the crown frequently rests upon a layer of dried leaves, which impart a severe character to the tree.

PALMS ON THE MIDDLE AMAZON



The form of the trunk also varies greatly, sometimes almost entirely disappearing, as in *Chamærops humilis*; sometimes, as in the Calami, assuming a bush-robe appearance, smooth or rugged, unarmed or bristling with spines. In the American *Yriarteas*,

it may be said that they unite in themselves all the faults without any of the virtues of their progenitors. As men they are generally inferior to the pure races, and as members of society they are the worst class of citizens." Orton quotes this, but makes decided qualifications to the generalization. "They display," he says, "considerable talent and enterprise; a proof that mental degeneracy does not necessarily result from the mixture of white with Indian blood. Our observations do not support the opinion that the result of amalgamation is 'a vague compound lacking character and expression.' The moral part is perhaps deteriorated; but in tact and enterprise they often exceed their progenitors." We have already, in Chapter II., quoted his statement that in Quito, where he had the best opportunity of becoming acquainted with them, "They are the soldiers, artisans, and tradesmen who keep up the only signs of life in Quito."

Agassiz thus sums up some of the leading capacities of the basin of the Amazon: "Its woods alone have an almost priceless value. Nowhere in the world is there finer timber either for solid construction or for works of ornament. The rivers which flow past these magnificent forests seem meant to serve first as a water-power for the saw-mills which ought to be established on their borders, and then as a means of transportation for material so provided. Yet all the lumber used is brought from Maine. Setting aside the woods as timber, what shall I say of the mass of fruits, resins, oils, coloring matter, textile fabrics which they yield? What surprised me most was to find that a great part of this region was favorable to the raising of cattle. An empire might esteem itself rich in any one of the sources of industry which abound in this valley; and yet the greater part of its vast growth rots on the ground, and goes to form a little more river-mud, or to stain the waters on the shores of which its manifold products die and decompose. Although the rivers abound in delicious fish, large use is made of salt cod imported from other countries; and bread and butter are brought from the United States and England."

Orton says of the Valley of the Amazon: "It possesses the most agreeable and enjoyable climate in the world, with a brilliant atmosphere only equaled by that of Quito, and with no changes of seasons. Life may be maintained with as little labor as in the Garden of Eden. Perhaps no country in the world is capable of yielding so large a return for agriculture. Nature, evidently designing this land as the home of a great nation, has heaped up her bounties of every description: fruits of richest flavors, woods of the finest grain, dyes of gayest colors, drugs of rarest virtues, and left no sirocco or earthquake to disturb its people."

*NOTE.—The length of the Amazon is very variously given by different authors, according as they consider one or another of the great rivers which unite to form it, to be the main stream; for it happens that the longer ones are not the larger. Thus from Lake Lauricocha to Pará, the distance including windings is estimated at 2,740 miles; but if we consider the Ucayali as the main affluent, the distance is about 3,000 miles. Lieutenant Herndon, considering the still longer but smaller Huallaga to be the true Amazon, estimates the total length at 3,944 miles, which others reduce to about 3,795 miles. The statement in the text is the one which, on the whole, seems to be the most accurate.

A. H. G.

APRIL, 1874.

growth; and yet only eight or ten months were necessary for its full development. Each shaft produces its fruit but once, when it withers and dies; but new shoots spring forth from the root, and before the year has elapsed unfold themselves with the same luxuriance. Thus, without any other labor than now and then weeding the field, fruit follows upon fruit and harvest upon harvest. A single bunch of bananas often weighs from sixty to seventy pounds, and Humboldt has calculated that thirty-three pounds of wheat and ninety-nine pounds of potatoes require the same space of ground to grow upon as will produce 4,000 pounds of bananas.

This prodigality of nature, seemingly so favorable to the human race, is, however, attended with great disadvantages; for where the life of man is rendered too easy, his best powers remain dormant, and he almost sinks to the level of the plant which affords him subsistence without labor. Exertion awakens our faculties as it increases our enjoyments, and well may we rejoice that wheat and maize, and not the banana, ripen in our fields.

As the seeds of the cultivated plantain and banana never, or very rarely, ripen, they can only be propagated by suckers. "In both hemispheres," says Humboldt, "as far as tradition or history reaches, we find plantains cultivated in the tropical zone. It is as certain that African slaves have introduced, in the course of centuries, varieties of the banana into America, as that before the discovery of Columbus the pisang was cultivated by the aboriginal Indians."



MANUFACTURE OF SAGO.

The *Sago-Palm* may fairly dispute with the plantain the honor of producing upon a given space the greatest amount of human food. It grows all over the islands of the Malayan Archipelago, the most productive district being in Ceram, whence large quantities are exported. The tree, says Mr. Wallace,* is a palm thicker and larger than the cocoa-nut tree, although rarely so tall, and having immense pinnate spiny leaves, which completely cover the trunk until it is several years old. When it is

* Malayan Archipelago, 382-385.

about ten or fifteen years old it sends up an immense terminal spike of flowers, after which it dies.

For making sago the tree must be used just before it is going to flower. It is cut down close to the ground, which, large as the tree is, costs no great labor, for the woody shell is only half an inch thick; the rest is all pith. The leaves and leaf-stalks are cleared away, and a broad strip of bark taken off the upper side of the trunk, laying bare the pithy matter, which is of a rusty color near the bottom, but higher up of a pure white, about as hard as a mealy apple, with woody fibres running through it, about a quarter of an inch apart. This pith is broken up into a coarse powder by a heavy wooden club or pounder, having a piece of hard quartz imbedded into the end. By means of this, strips of the pith are cut away, which fall down into the cylinder formed by the tough bark, until the whole trunk is cleared out, leaving a skin of not more than half an inch in thickness. This material is carried to the washing machine, which answers the purpose of a grist-mill for preparing the flour. This washing machine is composed wholly from the tree itself. The great sheathing bases of the leaves make excellent troughs; and their ribs, as thick as a man's arm, and lighter and tougher than a bamboo, furnish the supporting props; while the fibrous covering of the leaf-stalks forms the strainer. Water is poured on the mass of pith, which is kneaded and pressed against the strainer until the starch is all washed out, when the fibrous refuse is thrown away. The water, charged with the starch, passes into another deep trough, where the sediment is quickly deposited, the water running off. This mass of starch is made up into packages of thirty pounds, covered with sago leaves. This constitutes the "raw sago," and will keep for years. Boiled with water, it forms a thick glutinous mass, which is eaten with salt, limes, or Chili peppers.

More frequently it is used for making bread. The raw sago is broken up, dried in the sun, and powdered into a coarse meal. The oven is a square clay pan, divided into compartments six or eight inches square, and three-quarters of an inch thick. This is heated over a clear fire of embers, filled with the flour, and covered with a piece of sago bark. In five minutes the bread, or rather batch of cakes, is baked. When hot they are very palatable with butter; and the addition of a little sugar and grated cocoa-nut forms quite a delicacy. They are soft, and not unlike our "Johnny-cakes" made of maize flour, but have a slight characteristic flavor which is wanting in the prepared sago. When not wanted for immediate use, the cakes are dried in the sun for several days; they will then keep for years. They are hard, rough, and dry; but the natives do not mind that, and it is a common sight to see children gnawing away at them, as our children do at a crust of bread. Dipped in water and toasted, they become almost as good as when fresh; soaked and boiled, they make a good pudding. We see no reason why these sago biscuit should not form a welcome addition to ship-stores in tropical regions.

A good-sized tree will afford 900 pounds of raw sago. This will make 600 pounds of bread. Two cakes, weighing three to the pound, are as much as a man can well eat at a meal; five are considered a full day's allowance. One tree will therefore supply a man with food for a whole year. Two men will easily finish a tree in five days; so that a man may in ten days raise and make his flour for a year. If he chooses to bake his year's supply of bread at once, another ten days is quite enough; so that the labor of twenty days will give him food for a year. This is on the sup-

and another at Putten, since destroyed by the digging of a well under part of its roots, which, though but seventy feet high, was forty-six feet in girth.

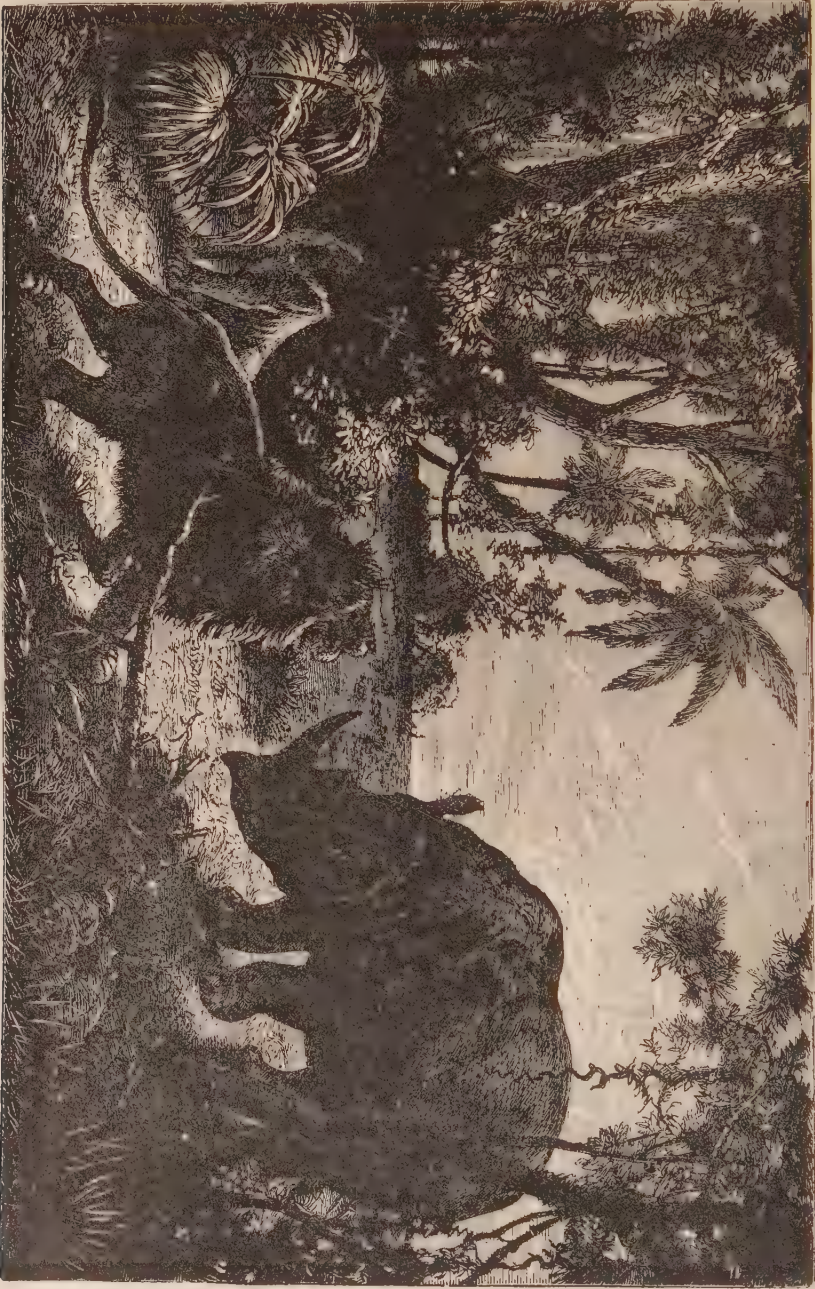


BAOBAB TREE, WITH THE GRAVE OF MRS. LIVINGSTONE.

Draccenas, or "dragon-trees," are found growing on the west coast of Africa and in the Cape Colony, in Bourbon and in China ; but it is only in the Canary Islands, in Madeira, and Porto Santo, that they attain such gigantic dimensions as to entitle them to rank among the vegetable wonders of the world. Near Orotava, in Tene-

travelers, most of them allured thither in pursuit of game. It may be considered as bounded by the parallels of 20° and 30° south of the equator, and from 17° to 30°

NATIVES OF THE KALAHARI.



of longitude, covering an area of 1,000 miles by 700. The great Kalahari occupies its center. The physical aspects of so vast a region of course vary. Taking its outside

rim, it may in general be described as a series of broad plains intercepted by rugged mountains of no great height. These plains during the wet season abound with juicy herbage, which disappears, fairly burned off, in the dry season, leaving the ground parched and dusty. Sometimes there are immense tracts overgrown with low, thorny bushes, standing so closely together that the traveler must chop his way through them step by step. The most common of these bushes is called by the colonists the "wait-a-bit," for its short hook-like thorns present a standing invitation to the passer to wait a bit at every foot of his advance. Andersson mentions once coming upon a considerable forest of thornless trees. "I do not think," he says, "that I was ever so surprised in my life. I hesitated to trust my senses. Even the dull faces of my native attendants seemed for a few seconds to relax from their usual heavy, unintelligent cast, and to express joy at the novel scene." The brief wet season, when the rain falls in torrents, is succeeded by months of absolute drought, when water is found only at long intervals in solitary fountains and stagnant pools. The books of travelers in this region present a continual record of sufferings endured by man and beast from lack of water.

But uninviting as this region otherwise is, it is the paradise of the sportsman. In other regions of the globe he is limited to a few species of the larger game. On our western prairies he is confined to bison; in India he must satisfy himself with tigers and wild hogs; in Ceylon he may bag tuskless elephants and buffalos; in Siberia he has only bears and wolves. But Southern Africa is a vast zoological garden. Giraffes raise their long necks above the stunted acacia trees, stooping to crop their topmost twigs. Gigantic boars, and their still bigger cousins the unwieldy hippopotami and rhinoceroses, abound. Leopards and hyenas find abundant prey in numerous species of antelopes, and in turn afford rich sport to the hunter. Lions are everywhere, from the sneaking brute who crawls stealthily upon his ignoble prey, to the ferocious "man-eater," in whom the taste of human flesh has awakened a new faculty which induces him to despise all meaner food, and to leap boldly into the camp of the hunter in search of a human victim. Elephants wander about singly, or in pairs and groups, or troop in vast herds to the lonely pools where they can quench their thirst. "They walk about as thick as cattle," said a native to Andersson, who had occasion to verify the statement; and Barth once counted two hundred elephants in a single herd on the banks of Lake Tschad. Besides these, there are ostriches, zebras, quaggas, and an almost innumerable variety of the deer tribe, such as oryxes, koodoos, inyalas, gnus, elands, springbucks, gemsbucks, hartebeests, leches, pallahs, and others whose very names have as yet found no place in books of natural history.

Such a superfluity of animal life presupposes no inconsiderable amount of vegetation even in these arid regions; for all animals directly or indirectly subsist upon vegetable food. The lion devours the deer; but he could find no deer to devour unless the deer could find grass and leaves to eat. Nature has also gifted these animals with an instinct which leads them to wander far and wide for food, and to divine where it is likely to be found. In so wide a pasture-ground all parts will not be parched at once; and beasts of prey follow in the tracks of their victims. Moreover, there are species of plants peculiar to these regions which go far to modify the apparent sterility, and store up food and even water beneath what appears to be dry sand. Such a plant is the *leroshúa*, whose low stalk is hardly larger than a crow's quill; but it sends its

roots deep down into the soil, which, at the depth of a foot or two, expand into a tuber of the size of a small melon, which is a mass of watery cellular tissue, like a young turnip. The mokuri, a low creeper, expands under ground into a cluster of tubers, some of them as large as a man's head. The clusters spread out in a circle of a yard in diameter. When a native suspects the existence of such a cluster, he pounds with stones around until a hollow sound tells him that he has found the spot. Many of the animals have sharp hoofs, and instinct points out to them the sites of these watery tubers, to reach which they dig away the sand, as the reindeer digs the snow which conceals the moss which is his food. The kengwe, a kind of gourd, a favorite with man and beast, sometimes covers immense tracts. Macabe once crossed the desert, in a favorable season, and found them so numerous that his cattle lived on them for three weeks, during which they had no water, and when this was reached they seemed quite indifferent to it. Another gourd, the naras, covers many of the low sand-hills. Its fruit, the size of a turnip, is on the outside of a greenish yellow, within of a deep orange, and for three months in the year constitutes the chief food of man and beast in the neighborhood of Walfisch Bay. Its seeds, something like an almond in looks and taste, are carefully gathered, dried, and preserved for food when the fruits have disappeared.

Judging from the geological character of this African semi-desert, there can be little doubt that water might be found by deep boring almost everywhere; for as the rainfall is great during the wet season, and as hardly any of it finds an outlet through rivers, much of it must sink into the sandy soil until it is arrested by beds of clay or underlying rock, and by digging down to these the water would be reached. Wherever and whenever water here exists, there is fertility; and it may be that the time will come when these now arid plains will be honey-combed with artesian wells, and thereby transformed into a garden. When that time comes, farewell to elephants and lions, to deer and antelopes. Wells, or rather pits, of slight depth, but which contain water throughout the year, except when two years of drought happen together, are not unfrequently found in the Kalahari. These pits are hidden with the utmost care. Sometimes the natives fill them up with loose sand, and build a fire over the spot; the ashes would naturally be taken as an indication that here at least no water was to be found beneath the surface. They are careful to establish their huts at a considerable distance from their hidden mine of liquid treasure. When they wish for water, the women set out from the village, carrying their water vessels, which consist of ostrich-shells, with a little hole in the end. A reed of nearly a yard in length, with a bunch of grass fastened to the end, is sunk down through the sand, which is then rammed closely around. By sucking through the reed a vacuum is made in the sponge-like bunch of grass; into this the water flows and passes through the reed into the mouth, whence it is squirted into the shells. This natural pump is really very efficacious for the shallow depth at which it is used.

Livingstone relates another circumstance which seems conclusive as to the fact that water exists in the Kalahari, at no very great distance below the surface of the ground. During two successive seasons of extreme drought, in neither of which the rainfall exceeded five inches, and every thing was parched, and the ground so hot that beetles placed upon the surface died in a few seconds, as though they had been placed on a heated plate of iron, a certain species of ants, who form long and deep galleries, were



AFRICAN WEAVERS.

of India. Another species, nearly similar in size and proportions, but distinguished by a much longer crest, inhabits the Javanese forests.

Though of less dazzling splendor than this peacock's tail, that of the *Menura*, or Lyre-bird, is unrivalled for its elegance. Fancy two large, broad, black and brown-striped feathers, curved in the form of a Grecian lyre, and between both, other feathers whose widely-distanced silken barbs envelope and surmount them with a light and airy gauze. No painter could possibly have imagined anything to equal this masterpiece of nature, which its shy possessor conceals in the wild bushes of Australia.

The lyre-bird is constantly engaged in traversing the brush from mountain top to the bottom of the gullies, whose steep and rugged sides present no obstacle to its long legs and powerful muscular thighs. When running quickly through the brush, it carries the tail horizontally, that being the only position in which it could be borne at such times. Besides its loud, full cry, which may be heard at a great distance, it has an inward and varied song, the lower notes of which can only be heard when you have stealthily approached to within a few yards of the bird when it is singing. Its habits appear to be solitary, seldom more than a pair being seen together. It constructs a large nest, formed on the outside of sticks and twigs, like that of a magpie, and lined with the inner bark of trees and fibrous roots.

But of all the tropical birds there are none so absolutely distinctive of the equatorial regions as the *Birds of Paradise*, which are found only in some of the islands of the Malay Archipelago. Until about 1868 really nothing was known to Europeans respecting these birds, which in gorgeousness of coloring and elegance of form and plumage surpass all others. Stuffed skins of these birds, curiously prepared, have long been found in European museums, and from these the strangest descriptions have been given, which still find place in books upon Natural History. When the early navigators reached the Moluccas in search of cloves and nutmegs, they were presented with dried skins of a kind of bird so beautiful as to excite even their wonder and admiration. Malay traders called them "God's Birds," and the Portuguese re-named them "Birds of the Sun." A learned Dutchman, who wrote in Latin, gave them the name which they now bear. These skins were always without feet or wings, and it was said, and currently believed, that no one had ever seen one of them alive; that they lived only in the air, and, being destitute of feet, never alighted; but as they were equally without wings, how they managed to keep afloat in the air was a mystery of which no solution was attempted. It was not till generations had passed that it was discovered that the natives, in preparing the skins, cut off their very serviceable legs and wings, and so arranged what was left as to give the greatest possible prominence to their flowing tail-plumage. One fable was thus displaced; but everything else remained unknown.

In 1862 Mr. Alfred Russell Wallace, an English naturalist, set himself seriously at work to investigate the Natural History of the Malay Islands; and to his work,* published in 1868, which we have already had frequent occasion to cite, we are indebted for about all that is really known respecting the Birds of Paradise; and this cost him five successive voyages, each occupying in preparation and execution nearly a year. He describes and illustrates eighteen different species. In all of these, it must be borne in mind that the brilliant colors and remarkable plumage belong to the

* The Malay Archipelago.

males ; the females being throughout very plain looking personages. "The Birds of Paradise," he says, "are a group of moderate-sized birds, allied in structure and habits to crows and starlings; but they are characterized by extraordinary developments of plumage which are unequaled by any other family of birds. In several



NATIVES OF ARU SHOOTING THE GREAT BIRD OF PARADISE.

species large tufts of delicate, bright-colored feathers spring from each side of the body beneath the wings, forming trains, fans, or shields ; and the middle feathers of the tail are often elongated into wires, twisted into the most fantastic shapes, or adorned with the most brilliant metallic tints. In another set of species these accessory plumes

greatest portion of their lives on trees. Nearer and nearer the squirrel came ; louder and louder were his chippings ; he tried to run away, but could not. At last he came within a foot of the snake. There was a pause ; then suddenly, like a flash of lightning, the snake sprang. The poor little squirrel was in the folds of the ugly reptile, and I soon saw his body gradually disappearing into its inflated mouth, and the broken silence of the forest resumed its sway." Here I leave the vexed question of serpentine fascination, with the expression of my own opinion that, while much can be said on both sides, yet, upon the whole, the nays have it.



CHARMING THE SQUIRREL.

The various serpent tribes are exposed to the attacks of many enemies, who fortunately keep their numbers within salutary bounds, and avenge the death of the countless insects, worms, toads, frogs, and lizards, that fall a prey to their strength or their venom. Several species of rapacious and aquatic birds live upon snakes, the American ostrich thins their ranks wherever he can, and the African "Secretary" is renowned for his prowess in serpentine warfare. "The battle was obstinate," says Le Vaillant, describing one of these conflicts, "and conducted with equal address on both sides. The serpent, feeling the inferiority of his strength, in his attempt to flee, and regain his hole, employed that cunning which is ascribed to him, while the bird, guessing his design, suddenly stopped him, and cut off his retreat by placing herself before him at a single leap. On whatever side the reptile endeavored to make its escape, his enemy was still found before him. Then, uniting at once bravery and cunning, he erected himself boldly to intimidate the bird, and hissing dreadfully, displayed his menacing throat, inflamed eyes, and a head swollen with rage and venom. Sometimes this threatening appearance produced a momentary suspension of hostilities, but the bird soon returned to the charge, and covering her body with one of her wings as a buck-

But Wallace goes beyond Du Chaillu in his accounts of the actual size of serpents existing in the almost unexplored Malayan islands. He says:* "One day my boy Ali came home with a story of a big snake. He was walking through some high grass, and stepped on something which he took for a small fallen tree; but it felt cold and yielding to his feet, and far to the right and left there was a waving and rustling of the herbage. He jumped back in affright, and prepared to shoot; but could not get



KILLING THE SNAKE—CENTRAL AFRICA.

a good view of the creature, and it passed away, he said, like a tree being dragged through the grass. As he had several times already shot large snakes, which he declared were all as nothing compared with this, I am inclined to believe it must have really been a monster. Such creatures are rather plentiful here, for a man close by showed me on his thigh the marks where he had been seized by one close to his house.

* Malay Archipelago, 392.



THE ROBBER CRAB—MALAY ARCHIPELAGO.—See page C74.

produce, on driving through a long line of them, a degree of exquisite pleasure only to be enjoyed in the clear, light atmosphere of these latitudes.

Cloves contain a very large proportion of essential oil, which combined with a peculiar resin gives them their pungent aroma. It seems, however, to require a combination of favorable circumstances of climate and soil for the full development of their virtues; for, though the tree is found in the larger islands of Eastern Asia, and in Cochin China, it has there little or no flavor, and the Moluccas seem to be the only place where the clove comes to perfection without being cultivated. Though it is at present planted in Zanzibar, Cayenne, Bourbon, Trinidad, and other places, yet Amboyna still furnishes the best quality and the largest quantity, exporting annually about a million of pounds.

In spite of the endeavors of the Dutch to confine the *Nutmeg* tree to the narrow precincts of Banda, it has likewise extended its range not only over Sumatra, Mauritius, Bourbon, and Ceylon, but even over the western hemisphere. It is of a more majestic growth than the clove, as it attains a height of fifty feet, and the leaves, of a fine green on the upper surface, and gray beneath, are more handsome in the outline, and broader in proportion to the length. When the trees are about nine years old, they begin to bear. They are *diœcious*, having male or barren flowers upon one tree, and female or fertile upon another. The flowers of both are small, white, bell-shaped, without any calyx; the embryo-fruit appearing at the bottom of the female flowers in the form of a little reddish knob. When ripe, it resembles in appearance and size a small peach, and then the outer rind, which is about half an inch thick, bursts at the side, and discloses a shining black nut, which seems the darker from the contrast of the leafy network of a fine red color with which it is enveloped. The latter forms the Mace of commerce, and having been laid to dry in the shade for a short time, is packed in bags and pressed together very tightly. The shell of the nut is larger and harder than that of the filbert, and could not, in the state in which it is gathered, be broken without injuring the nut. On that account the nuts are successively dried in the sun and then by fire-heat, till the kernel shrinks so much as to rattle in the shell, which is then easily broken. After this the nuts are three times soaked in sea-water and lime; they are then laid in a heap, where they heat and get rid of their superfluous moisture by evaporation. This process is pursued to preserve the substance and flavor of the nut, as well as to destroy its vegetative power. The kernel contains both a fixed oil, which is obtained by pressure, a pound generally yielding three ounces, and a transparent volatile oil, which may be obtained by distillation in the proportion of one thirty-second part of the weight of nutmeg used. The outer rinds are likewise not without use to the natives. They are laid in large heaps, and allowed to putrefy, when they get covered with a blackish mushroom, which is esteemed as a great delicacy.

Pepper, although not so costly as cloves or cinnamon, is of a much greater commercial value, as its consumption is at least a hundred times greater. It grows on a beautiful vine, which, incapable of supporting itself, twines round poles prepared for it; or, as is more common in the Travancore plantations, the pepper vines are planted near mango and other trees of straight high stems. As these are stripped of

ANIMALS OF THE TROPICAL WORLD.

CHAPTER VIII.

INSECTS.

Multitude of Tropical Insects—Beetles—Dragon Flies—Leaf Moths—The Leaf Butterfly—Fire Flies.—*Insect Plagues*: Mosquitoes—Chigoes, or Jiggers—The Filaria Medinensis—The Bête Rouge—Ticks—Land-Leeches—The Tsetse Fly—The Tsalt-Salya Locusts—Cockroaches—Enemies of the Cockroach.—*Useful Insects*: The Silk-Worm—The Cochineal Insect—The Gum-Lac Insect—Edible and Ornamental Beetles.

HAVING thus passed in rapid survey over the characteristic forms of the Vegetable World of the Tropics, we now proceed to the Animal Kingdom, commencing with Insects, and proceeding to Reptiles, Birds and Beasts.

On advancing from the temperate regions to the pole, we find that insect life gradually diminishes in the same ratio as vegetable life declines. The reverse takes place on advancing towards the equator; for, as the sun rises more and more to the zenith, we find the insects gradually increasing with the multiplicity of plants, and at length attaining the greatest variety of form, and the highest development of number, in those tropical lands where moisture combines with heat in covering the ground with a dense and everlasting vegetation. Thus while not a single species of beetle is found on Melville Island, Greenland boasts of 11; Lapland of 813; Sweden of 2,083. In the milder climate of England their number increases to 2,263; in France it rises to 4,200; and the hothouse temperature of Brazil, from Rio Janeiro to Bahia, fosters no less than 7,500 specific forms of beetle life. In Borneo Mr. Wallace collected 2,000 distinct species of beetles within the space of a single square mile; some of them of forms to the oddity of which no parallel can be found elsewhere. Thus, also, while the whole of Europe and Siberia hardly possess more than 250 butterflies, the explored parts of Brazil, which are very inferior in extent, have already furnished the naturalist with no less than 600 species, and no doubt contain many more.

In the countries which, from the never failing abundance of food, and constant warmth, are most favorable to the multiplication of insects, these creatures may naturally be expected to attain the greatest size. Thus the European rhinoceros beetle, though an inch and a quarter long, is far surpassed by the Megasominae of torrid America. The colossal Hercules beetle attains a length of five or even six inches, and is distinguished, like the other species of the genus, by the singular horn-shaped processes rising from the head and thorax, which give it a very grotesque and even formidable appearance. Though but little is yet known of its economy, it most likely subsists upon putrescent wood, and evidently leads a tree life, like the other

with marks on each side resembling leaf-veins. When the wings are closely pressed together, the whole outline is exactly like that of a half-shrivelled leaf, which it then resembles in color. The tail of the hind wings forms a perfect stalk, and rests upon the twig, while the insect is supported by the middle pair of legs, which are hardly to be distinguished from the twigs around. The head is drawn back between the wings, at whose base is a notch to let it in. Knowing all this, one must look closely at the picture which he gives in order to distinguish the alighted butterfly from a leaf.



THE LEAF BUTTERFLY.

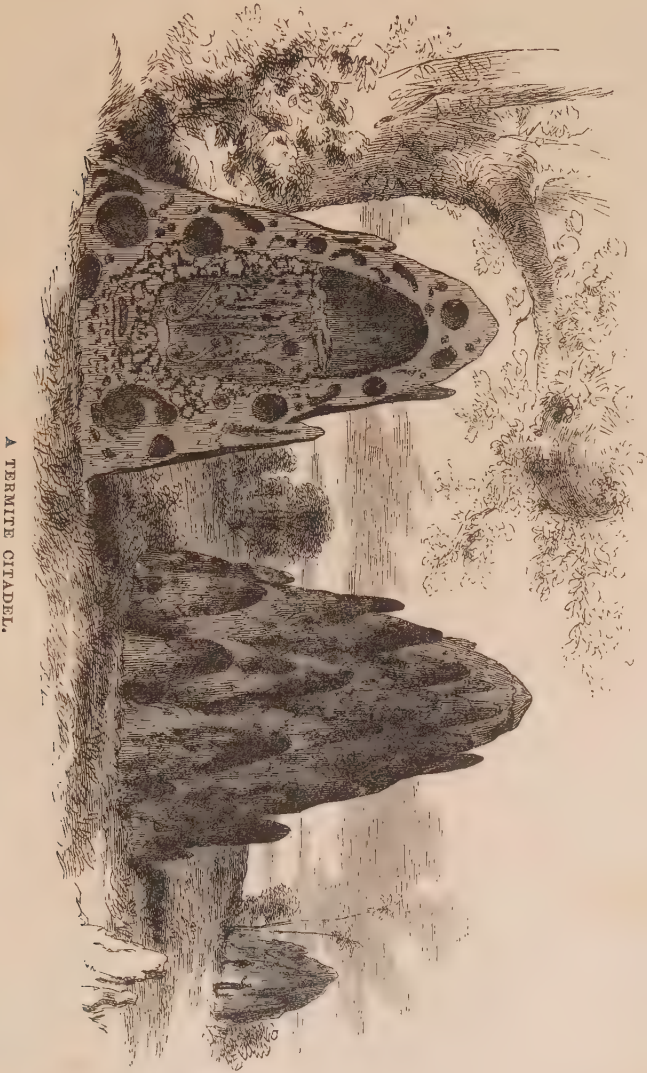
Another singular insect is the Mantis, or "Soothsayer," notable for its apparently feeble structure and voracious appetite. It is of slow movement, yet flies constitute a great part of its food. It steals cautiously upon its prey, and, when near enough, flings out its long fore-legs and grasps its prey. These legs are curiously constructed; the tibia can be shut upon the sharp edge of the thigh, like a pair of shears, with which it can cut any slender substance, and even give a decidedly unpleasant nip upon the finger of the naturalist who incautiously seizes it.

The Mantis, by the attitude it assumes when lurking for its prey or advancing upon it—which is done by the support of the four posterior legs only, whilst the head and

soon as the first rains have fallen, the male and female perfect termites, each about the size of two soldiers, or thirty laborers, and furnished with four long, narrow wings, folded on each other, emerge from their retreats in myriads. After a few hours their fragile wings fall off, and on the following morning they are discovered covering the surface of the earth and waters, where their enemies—birds, reptiles, ants—cause so sweeping a havoc that scarce one pair out of many thousands escapes destruction. If by chance the laborers, who are always busy prolonging their galleries, happen to meet with one of these fortunate couples, they immediately, impelled by their instinct, elect them sovereigns of a new community, and, conveying them to a place of safety, begin to build them a small chamber of clay, their palace and their prison—for beyond its walls they never again emerge. Soon after the male dies, but, far from pining and wasting over the loss of her consort, the female increases so wonderfully in bulk that she ultimately weighs as much as 30,000 laborers, and attains a length of three inches, with a proportional width. This increase of size naturally requires a corresponding enlargement of the cell, which is constantly widened by the indefatigable workers. Having reached her full size, the queen now begins to lay her eggs, and as their extrusion goes on uninterruptedly, night and day, at the rate of fifty or sixty in a minute, for about two years, their total number may probably amount to more than fifty millions. This incessant extrusion of eggs necessarily calls for the attention of a large number of the workers in the royal chamber, to take them as they come forth, and carry them to the nurseries, in which, when hatched, they are provided with food, and carefully attended till they are able to shift for themselves, and become in their turn useful to the community.

In widening their buildings according to the necessities of their growing population, from the size of small sugar-loaves to that of domes which might be mistaken for the hovels of Indians or negroes, as well as in repairing their damages, the termite workers display an unceasing and wonderful activity; while the soldiers, or neuters, which are in the proportion of about one to every hundred laborers, and are at once distinguished by the enormous size of their heads, armed with long and sharp jaws, are no less remarkable for their courage and energy. When any one is bold enough to attack their nest and make a breach in its walls, the laborers, who are incapable of fighting, immediately retire, upon which a soldier makes his appearance, obviously for the purpose of reconnoitering, and then also withdraws to give the alarm. Two or three others next appear, scrambling as fast as they can one after the other; to these succeed a large body, who rush forth with as much speed as the breach will permit, their numbers continually increasing during the attack. These little heroes present an astonishing, and at the same time a most amusing spectacle. In their haste they frequently miss their hold, and tumble down the sides of their hill; they soon, however, recover themselves, and being blind, bite everything they run against. If the attack proceeds, the bustle increases to a tenfold degree, and their fury is raised to its highest pitch. Woe to him whose hands or legs come within their reach, for they will make their fanged jaws meet at the very first stroke, drawing their own weight in blood, and never quitting their hold, even though they are pulled limb from limb. The courage of the bull-dog is as nothing compared to the fierce obstinacy of the termite-soldier. So soon as the injury has ceased, and no further interruption is given, the soldiers retire, and then you will see the laborers hastening in various directions towards

in various places, and into the lower half of the building, or communicating with every part of it by other smaller circular passages. The necessity for the vast size of the main galleries underground, evidently arises from the circumstance of their being the great thoroughfare for the inhabitants, by which they fetch their clay, wood, water, or provisions, and their gradual ascent is requisite, as the termites can only with great difficulty climb perpendicularly.



It may be imagined that such works require an enormous population for their construction; and, indeed, the manner in which an infant colony of termites is formed and grows, until becoming, in its turn, the parent of new migrations, is not the least wonderful part of this wonderful insect's history. At the end of the dry season, as

half feet in hight, came running to its mother, who gave a kind of chuckle that very much resembled the 'click' of the Bushmen of Southern Africa. I began to be terribly excited. I must kill the mother, and try to capture the young one. Unfortunately there were many intervening trees, and she was about a hundred yards off. How could the bullet from my rifle reach her? I had just left my place of concealment, when she perceived me. She uttered a piercing cry, and disappeared, with her young one following her."



FEMALE GORILLA AND YOUNG.

Du Chaillu, in his various expeditions, which occupied in all twelve years, brought away thirty-one gorilla skins and skeletons, captured more than a dozen young ones, and altogether saw more than three hundred of the animals. We give from his book last cited one more picture of the domestic life of the gorilla :

"The bog was like one of the worst kind we have in America in the overflowed and woody land of the Western country ; only here were creepers, thorny bushes, hanging lianas, and grass that cuts like a razor. We entered the swamp, and came to a dry spot, when we spied a female gorilla and her young baby. The baby was very small, and a very dear little baby it was to its mother, for she appeared to look at it with great fondness. I was spell-bound, and could not raise my gun to fire ; there was something too human in that mother and her offspring. It hung by her breast ; but unlike our babies, who have to be entirely supported, its little hands clutched its mother's shoulder and helped to support itself. The little fellow gave a shrill and plaintive cry, and crawled from its mother's arms to her breast to be fed ; and the mother lowered her head and looked at her child, while with its little fingers it pressed her breast so that the milk should come more freely. On a sudden the mother gave a tremendous cry, and before I knew it she had disappeared in the forest."

As the gorilla is wholly confined to a belt in equatorial Africa, so the great Orang-outang (*Simia satyrus*) or Mias, as it is called by the natives, is only found in Borneo

and Sumatra. To Mr. Wallace we are indebted for by far the most reliable account of this great ape, which until Du Chaillu's discovery of the gorilla was supposed to be the largest of the species. We give, much abridged, portions of his account :

"I was out collecting insects, not more than a quarter of a mile from the house, when I heard a rustling in a tree near, and looking up saw a large red-haired animal moving slowly along, hanging from the branches by its arms. It passed on from tree to tree till it was lost in the jungle. About a fortnight afterward I heard that one was feeding in a tree in the swamp, and taking my gun I was fortunate enough to find it. As soon as I approached, it tried to conceal itself among the foliage ; but I got a shot at it, and the second barrel caused it to fall down almost dead, the two balls having entered the body. This was a male, about half-grown, being scarcely three



FEMALE ORANG-OUTANG.

feet high. Soon after I shot another about the same size. I gave it two shots, one of which lodged in the body, the other broke its arm. Two Dyaks ran up to it, and each seized hold of a hand. But although one arm was broken, and it was only half-grown, it was too strong for them, drawing them up towards its mouth notwithstanding all their efforts so that they were obliged to let go. It now began climbing the tree, and I shot it through the heart. A week after, I fired at one on a high tree. On seeing me it began howling in a strange voice like a cough, and seemed in a great rage, breaking off branches with its hands, and throwing them down, and then made off over the tree-tops. A week after I found another, which behaved in a similar manner. I shot at it five times, and it remained dead on the top of the tree, supported in a fork, whence it was brought down by some Dyaks who climbed up for it. This was the first full-grown specimen I had obtained ; but it was a female, and not nearly so large or remarkable as the full-grown males. It was, however, three feet six inches high, and its arms stretched out to a width of six feet six inches. I preserved the skin of this animal, from which the above picture, from a photograph, was taken.

"Ten days after, I succeeded in shooting a full grown male. My assistant told

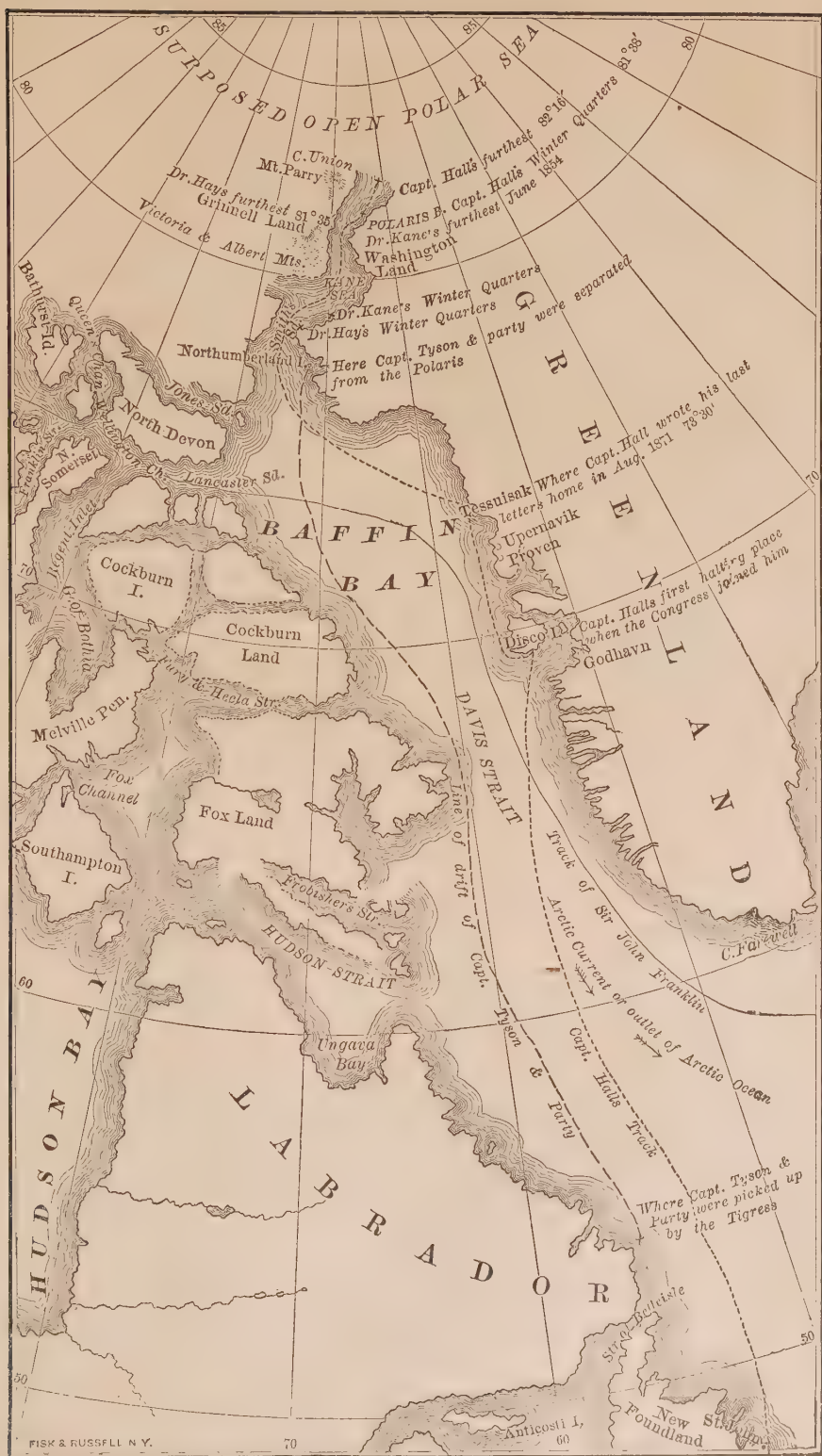
CHAPTER XLIV.

THE LAST EXPEDITION OF CHARLES FRANCIS HALL.

Charles Francis Hall.—His second Expedition.—His last Expedition.—The *Polaris*.—Officers and Crew.—Setting out.—A slight Dispute.—Off for the Pole.—Hall's farewell Dispatch.—The next Tidings.—The rescued Nineteen.—Their Story.—Voyage to the highest Latitudes.—Taking up Winter Quarters.—Hall's last Sledge Journey.—His last Dispatch.—The Return to the *Polaris*.—Sickness and Death of Hall.—Buddington takes Command.—Winter in the Ice.—Aspects of the Region.—Accident to the *Polaris*.—A Boat Expedition.—Starting for Home.—The *Polaris* in Peril.—Taking to the Ice.—The Separation.—The Parting on the Ice.—Herron's Journal.—*October*: Abandoned.—A Fortnight's Waiting.—*November*: Trying for the Shore.—A Godsend.—Amusements.—Beginning to Drift.—Killing the Dogs.—A Thanksgiving Dinner.—*December*: Adrift.—Eating Seal Skin, and Fox Meat.—Game in the wrong Place.—A Christmas Dinner.—*January*: Unpleasant New Year's.—Drifting Southward.—Another Godsend.—A Sight of the Sun.—Drifting on.—*February*: Snow Storms.—Narwhals and Seals.—Piles of Ice.—A Sight of Land.—Off from the Sealing Ground.—Provisions Short.—Ebierbing the main Stay.—Dovekies.—*March*: Seals, Birds, and Icebergs.—The Floe Splitting.—On a Fragment.—More God-sends.—The first Day of Spring.—Launching the Boat.—More Seals.—Rate of Drift.—Floe wearing away.—*April*: Taking to the Boat.—Ice and Water.—Repairing the Boat.—Plenty of Seals.—Floe breaking up.—A Struggle for Existence.—Ebierbing and Hans to the Rescue.—A fearful Night.—Six Months adrift.—Stealing Food.—On short Allowance.—Thoughts of Cannibalism.—A Seal and three more Meals certain.—A dainty Repast.—Swept over by the Sea.—The last ten Days.—Length of the Drift.—A hungry Bear and hungrier Men.—A desperate Risk.—Seals again.—In fresh Peril.—A Steamer in Sight.—The Steamer Disappears.—Another Steamer in Sight.—Hopes and Fears.—The last Entry in Herron's Journal.—The Fog lifts.—The Tigress.—Saved at Last.—Wonders of the Drift.—Ebierbing the Hero.—Conduct of the Men.—Proposed Searches for the *Polaris*.

IN 1859, at a meeting of the New York Geographical Society, held in honor of Dr. Kane, a plain blunt man introduced himself to the President with the words, "I want to go and find the bones of Sir John Franklin." In a rather hesitating manner he proceeded to explain the plan which he had conceived in his Western home. Something in the manner of the man won the confidence of Henry Grinnell, and the result was that a scanty outfit was provided, and Charles Francis Hall set out on his first expedition, which has already been described in these pages.

I first saw Hall immediately upon his return from this expedition. He brought his journal and notes to a publishing house for which I was acting as literary adviser, wishing to have them published. I saw at once that they were of unusual interest, and had no hesitation in advising that they should be prepared for the press; and while this was in course of execution, I saw Hall almost every day. Many of the very best portions of the book were exact copies of his original memoranda, written in an Esquimaux snow hut, with pencil, because ink could not be kept unfrozen.





OFFICERS OF THE POLARIS.

CHAPTER XLV.

THE FATE OF THE POLARIS.

The Search for the *Polaris*.—The First Tidings.—Second Tidings of the Safety of the Crew.—The Search for the *Tigress*.—At Northumberland Island.—At Littleton Island.—Greeting by the Esquimaux.—Last of the *Polaris*.—The Abandoned Hut.—Close of the Search.—The Escape of the Crew of the *Polaris*.—The Separation in the Ice.—Beaching the Vessel.—Preparations for the Winter.—Forebodings for the Future.—Chester, the Right Man for the Emergency.—Building the Boats.—The Scurvy.—Getting off.—Skirting the Ice.—At Hakluyt Island.—Fighting a Whale.—The Rescue.—Arrival at Dundee.—Reception of the News.—Results of the Expedition.—Finis.

IN the preceding chapter has been narrated the voyage of the *Polaris* to the most extreme northern point ever as yet reached by civilized man, together with the untimely death of Charles Francis Hall, her noble commander, and the wonderful adventures of that portion of her crew who, on the 15th of October, 1872, became separated from the vessels. Mention has also been made of the two vessels, the large *Juniata* and the small *Tigress*, which were sent by the government of the United States to ascertain the fate of the *Polaris*, and, if possible, to rescue the remainder of her crew. This chapter will narrate the results of these efforts, and bring to a close the story of this remarkable exploring expedition.

After the departure of the *Tigress* from New York, in July, 1873, weeks passed before any tidings came back from the Arctic regions, whither she had gone. But, on the 10th of September, the telegraph brought from St. Johns, Newfoundland, a brief dispatch to the effect, that the place where the people of the *Polaris* had passed the preceding winter had been found; that the vessel, herself, had been lost; but that the crew had, a few weeks before, set off southward in boats, which they had constructed, and that, in all likelihood, they had been picked up by some whaling vessel which would convey them either to Labrador or Europe.

A week later came another telegram announcing that the *Polaris* party had all arrived safely in Dundee, Scotland, whither they had been brought by a whaling vessel.

The story of the search is best told by Commander Green, of the *Tigress*; what, in the meantime, happened to the people of the *Polaris*, must be learned from their own narratives.

The *Tigress* reached the Arctic seas in safety, and on the 11th of August, 1873, steamed northward from Upernavik, heading for Tessuisak, which Hall, two years before, had styled the most northern known civilized settlement on the globe. At Tessuisak, not a word had been heard from the *Polaris* since she had so hopefully de-

parted. A steam launch, the little *Juniata*, belonging to the large *Juniata*, was here. She had gone as far northward as she could, but had learned nothing of the *Polaris*.

On the 12th of August the *Tigress* pointed her prow northward, and soon passed Cape York, keeping as close to the shore as the ice would permit, and all the time watching for any signal that might be made from the land. But the ice-bound coast gave back no signal that any human being saw the smoke from the steamer.

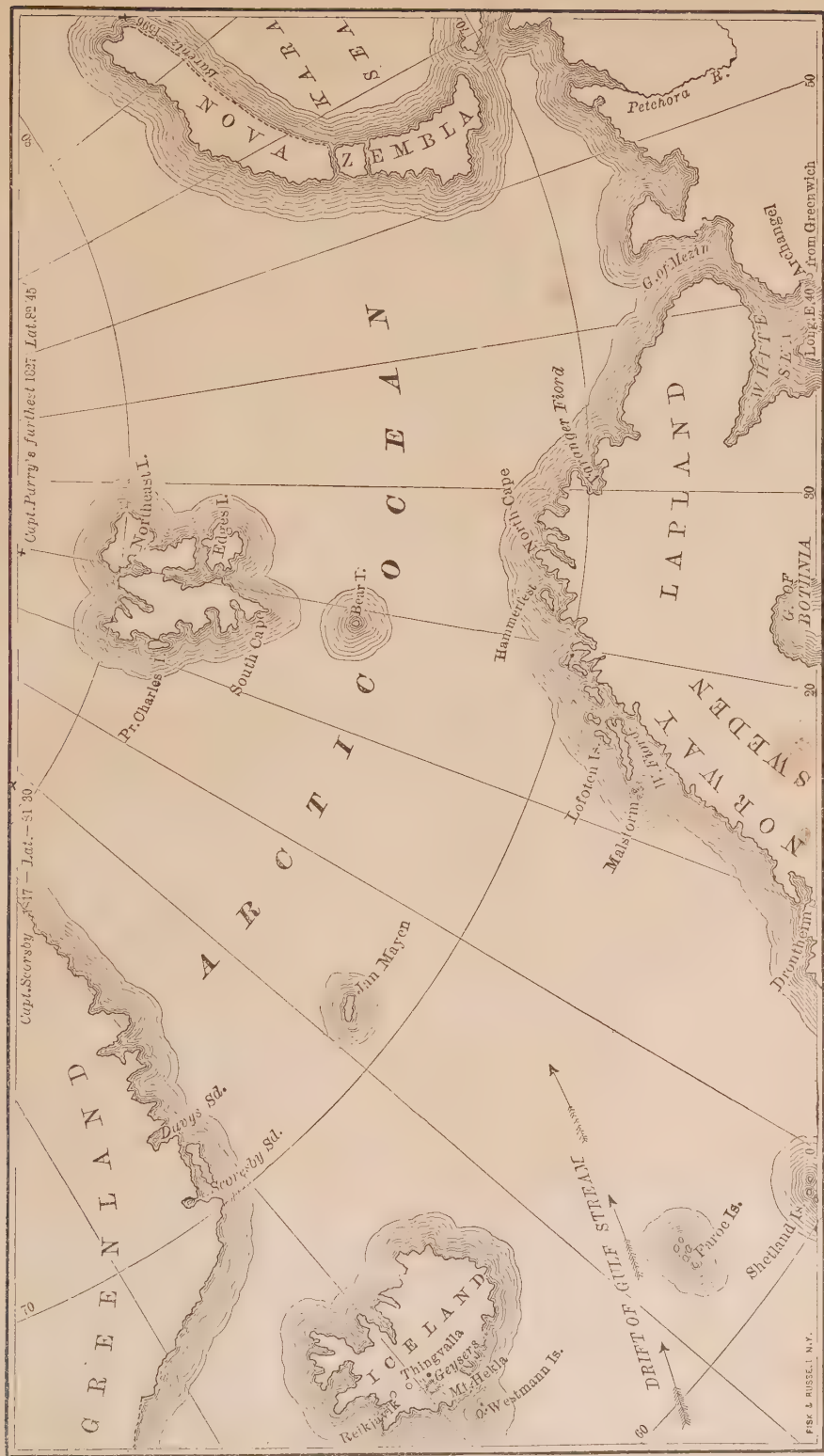
On the 13th, the *Tigress* skirted Northumberland Island, near which, as was believed, and as is noted on the map, on page 756, Tyson and his party were separated from the *Polaris*; but some of that party, who were on board the *Tigress*, could not recognize the spot; and it was concluded that the separation had really taken place at some place still further northward. At 9 in the evening, of the 14th, as measured by the clock, though at this season, in these latitudes, there is scarcely any distinction between day and night, they brought up at Littleton Island, standing out darkly in the wintry sky. This looked like the place for which they were in search; and a boat was lowered and sent to shore to learn, if might be, whether the *Polaris* had ever been there. The boat dodged among the icebergs and was soon lost to view; but before long a faint sound of cheering was heard from the shore. In an hour or two the boat came back with tidings. The crew had landed, and saw dimly in the distance a hut which had evidently been built by civilized men, while hurrying down to meet them were a half dozen Esquimaux, who told them, as well as they



DISCOVERY OF POLARIS CAMP.

could, that this was the place where some white men had passed the preceding winter, but that they had gone away a moon or two before, about the time when the ducks began to hatch.

These Esquimaux had been on a hunting expedition, and when they came here they found the big ship tied fast to the shore, and the white men living in the hut. When they went away, their head man had told the Esquimaux that they might have the ship, and all there was left on board. But not long after, a gale of wind came



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